SOLUTIONS OF DAILY PRACTICE PROBLEMS

DPP-NO-2A

1. If $\log_2 x + \log_4 x = 6$
   $\frac{\log x}{\log 2} + \frac{\log x}{\log 4} = 6$
   $\frac{\log x}{\log 2} + \frac{\log x}{\log 2^2} = 6$
   $\frac{\log x}{\log 2} + \frac{\log x}{2\log 2} = 6$
   $\frac{\log x}{\log 2}\left[1 + \frac{1}{2}\right] = 6$
   $\frac{\log x}{\log 2} \times \frac{3}{2} = 6$
   $\frac{\log x}{\log 2} = 6 \times \frac{3}{2}$
   $\frac{\log x}{\log 2} = 4$
   Log x = 4 log 2
   Log x = log 2^4
   X = 2^4
   X = 16
2. Given $\log_x y = 100$ …………………(1)
   $\text{Log}_2 x = 10$ …………………..(2)
   Multiply eq (1) & (2)
   $\text{Log}_x y . \log_2 x = 100 \times 10$
   $\frac{\log y}{\log x} \times \frac{\log x}{\log 2} = 1{,}000$
   Log y = 1,000 log 2
   Log y = log $2^{1,000}$
   Y = $2^{1,000}$
3. Given
   $\left(\log_{\sqrt{x}} 2\right)^2 = \log_x 2$
   $\left(\frac{\log 2}{\log \sqrt{x}}\right)^2 = \left(\frac{\log 2}{\log x}\right)$
   $\left(\frac{\log 2}{\log x^{1/2}}\right)^2 = \frac{\log 2}{\log x}$
   $\left(\frac{\log 2}{\frac{1}{2}\log x}\right)^2 = \frac{\log 2}{\log x}$
   $\left(\frac{2\log 2}{\log x}\right)^2 = \frac{\log 2}{\log x}$
   $4\left(\frac{\log 2}{\log x}\right)^2 = \left(\frac{\log 2}{\log x}\right)^1$
   $4\frac{\log 2}{\log x} = 1$
   4 log 2 = log x
   Log 2^4 = log x

$2^4 = x$

$X = 16$

4. $\text{Log}_4 9 . \text{Log}_3 2$

$\frac{\log 9}{\log 4} . \frac{\log 2}{\log 3}$

$\frac{\log 3^2}{\log 2^2} . \frac{\log 2}{\log 3}$

$\frac{2\log 3}{2\log 2} . \frac{\log 2}{\log 3}$

1

5. If $x = \log_{24} 12$, $y = \log_{36} 24$ and $z = \log_{48} 36$, then $xyz + 1$

$\text{Log}_{24} 12 \times \log_{36} 24 \times \log_{48} 36 + 1$

$\frac{\log 12}{\log 24} . \frac{\log 24}{\log 36} . \frac{\log 36}{\log 48} + 1$

$\frac{\log 12}{\log 48} + 1$

$\frac{\log 12 + \log 48}{\log 48}$

$\frac{\log(12 \times 48)}{\log 48}$

$\frac{\log(576)}{\log 48}$

$\frac{\log 24^2}{\log 48}$

$\frac{2\log 24}{\log 48}$

$2 . \frac{\log 24}{\log 36} . \frac{\log 36}{\log 48}$

$2 . \log_{36} 24 . \log_{48} 36$

$2yz$

6. Given $\log x = a + b$, $\log y = a - b$

$\log\left(\frac{10x}{y^2}\right) = \log 10x - \log y^2$

$= \log 10 + \log x - 2\log y$

$= 1 + (a + b) - 2(a - b)$

$= 1 + a + b - 2a + 2b$

$= 1 - a + 3b$

7. If $\log 2 = 0.3010$ and $\log 3 = 0.4771$

Then $\log 24 = \log(2 \times 2 \times 2 \times 3)$

$= \log 2 + \log 2 + \log 2 + \log 3$

$= 3\log 2 + \log 3$

$= 3 \times 0.3010 + 0.4771$

$= 0.9030 + 0.4771$

$= 1.3801$

8. $\text{Log}\ (1^3 + 2^3 + 3^3 + \text{------} + n^3)$

$\text{Log}\ (\sum n^3)$

$\log \left[\frac{n(n+1)}{2}\right]^2$

$2 \log \left[\frac{n(n+1)}{2}\right]$

2 [log n + log (n + 1) – log 2]

2 log n + 2 log (n + 1) – 2 log 2

9. $\text{Log}_4 9.\ \text{Log}_3 2 = \frac{\log 9}{\log 4} . \frac{\log 2}{\log 3}$

$= \frac{\log 3^2}{\log 2^2} . \frac{\log 2}{\log 3}$

$= \frac{2 \log 3}{2 \log 2} . \frac{\log 2}{\log 3}$

= 1

10. If $\log_3[\log_4(\log_2 x)] = 0$

$\text{Log}_4(\log_2 x) = 3^0$

$\text{Log}_4(\log_2 x) = 1$

$\text{Log}_2 x = 4^1$

$\text{Log}_2 x = 4$

$X = 2^4$

X = 16

DPP-NO-2B

1. Given : n = M! for M ≥ 2
$\frac{1}{\log_2 n}+\frac{1}{\log_3 n}+\frac{1}{\log_4 n}+\cdots\ldots\ldots+\frac{1}{\log_m n}$ or,
$=\log_2 n+\log_3 n+\log_4 n+\cdots\ldots..+\log_m n$
= $\log_n(2x3x4x\ldots\ldots\ldots xm)$
= $\log_n(m!)$
= $\log_n{}^n$
= 1

2. The integral part of logarithm is called Characteristic and the decimal part of a logarithm is called Mantissa.

3. If $\log_4(x^2 + x) - \log_4(x + 1) = 2$
$\text{Log}_4\left\{\frac{(x^2+x)}{(x+1)}\right\} = 2$
$\text{Log}_4\left\{\frac{x(x+1)}{(x+1)}\right\} = 2$
$\text{Log}_4 x = 2$
$X = 4^2$
X = 16

4. $\text{Log}_5 3 \times \log_3 4 \times \log_2 5$
$\frac{\log 3}{\log 5}\times\frac{\log 4}{\log 3}\times\frac{\log 5}{\log 2}$
$\frac{\log 4}{\log 2}$
$\frac{\log 2^2}{\log 2}$
$\frac{2\log 2}{\log 2}=2$

5. $\frac{1}{\log_3 60}+\frac{1}{\log_4 60}+\frac{1}{\log_5 60}$
$\text{Log}_{60}3 + \log_{60}4 + \log_{60}5$
$\text{Log}_{60}(3 \times 4 \times 5)$
$\text{Log}_{60}60$
1

6. If $\log\left(\frac{x-y}{2}\right)=\frac{1}{2}(\log x+\log y)$
$2\log\left(\frac{x-y}{2}\right)=\log x+\log y$
$\log\left(\frac{x-y}{2}\right)^2 = \log(xy)$

$\left(\frac{x-y}{2}\right)^2$ =xy

$\left(\frac{x-y}{4}\right)^2$ = xy

$X^2 + y^2 - 2xy = 4xy$

$X^2 + y^2 = 4xy + 2xy$

$X^2 + y^2 = 6xy$

7. If $x = 1 + \log_p qr$, $y = 1 + \log_q rp$, $z = 1 + \log_r pq$

   $X = 1 + \frac{\log qr}{\log p}$

   $X = \frac{\log p + \log qr}{\log p}$

   $X = \frac{\log pqr}{\log p}$

   $\frac{1}{x} = \frac{\log p}{\log pqr}$

   Similarly

   $\frac{1}{y} = \frac{\log q}{\log pqr}$

   $\frac{1}{z} = \frac{\log r}{\log pqr}$

   $\frac{1}{x} + \frac{1}{y} + \frac{1}{z} = \frac{\log p}{\log pqr} + \frac{\log q}{\log pqr} + \frac{\log r}{\log pqr}$

   $\frac{\log p + \log q + \log r}{\log pqr}$

   $\frac{\log pqr}{\log pqr}$

   1

8. Log x = m + n and log y = m – n

   Then $\log\left(\frac{10x}{y^2}\right) = \log 10x - \log y^2$

   Log 10 + log x – 2 log y

   1 + log x – 2log y

   1 + (m + n) - 2 (m – n)

   1 + m + n – 2m + 2n

   3n – m + 1

9. $(\log_y x.\ \log_z y.\ \log_x z)^3$

   $\left(\frac{\log x}{\log y} \cdot \frac{\log y}{\log z} \cdot \frac{\log z}{\log x}\right)^3$

   $(1)^3$

   1

10. If $x^2 + y^2 = 7xy$

    $X^2 + y^2 + 2xy = 7xy + 2xy$

    $(x + y)^2 = 9xy$

    Taking log on both side

$\text{Log}(x + y)^2 = \log 9xy$

$2 \log (x + y) = \log 9 + \log x + \log y$

$2 \log (x + y) = \log 3^2 \log x + \log y$

$2 \log (x + y) = 2 \log 3 + \log x + \log y$

$2 \log (x + y) – 2 \log 3 = \log x + \log y$

$2\left[\log \frac{(x+y)}{3}\right]$

$\text{Log } x + \log y$

$\text{Log } \log \frac{(x+y)}{3} = \frac{1}{2}[\log x + \log y]$

DPP-NO-3A

1. Given : $\frac{5x-3y}{5y-3x} = \frac{3}{4}$
   4 (5x – 3y) = 3 (5y – 3x)
   20x + 9x = 15y + 12y
   29x = 27y
   $\frac{x}{y} = \frac{27}{29}$
   Or, x : y = 27 : 29

2. Given : 'α' and 'β' are roots of $x^2 + x + r = 0$ and $\alpha^3 + \beta^3 = -6$
   Quadratic equation : $x^2 + x + r = 0$
   Here a = 1, b = 1 and c = r
   Sum of roots : α + β = $\frac{-b}{a}$ = -1
   And product of roots : α – β =$\frac{c}{a}$ = r
   Also,
   $\alpha^3 + \beta^3 = (\alpha + \beta)^3 - 3\alpha\beta(\alpha + \beta)$
   on putting the values,
   $-6 = (-1)^3 - 3r(-1)$
   R = -5/3

3. The roots of the equation
   $Px^2 + qx + r = 0$ are α & β
   Given α = r then,
   Sum of roots α + β = $\frac{-b}{a}$
   r + β = $\frac{-q}{p}$…………………………(1)
   product of roots
   α.β = $\frac{c}{a}$
   r.β = $\frac{r}{p}$
   β = $\frac{1}{p}$

4. Let the roots of Q.E $4x^2 - 6x + P = 0$ is α, β
   Here
   A = 4, b = -6, c = p
   α : β = 1 : 2

$\alpha = k, \beta = 2k$

$\alpha + \beta = \frac{-b}{a}$

$k + 2k = -\left(\frac{-6}{4}\right)$

$3k = \frac{3}{2}$

$K = \frac{1}{2}$..........................(1)

And $\alpha.\beta = \frac{c}{a}$

$k.\ 2k = \frac{p}{4}$

$2k^2 = \frac{p}{4}$

K = ½

$2.\left(\frac{1}{2}\right)^2 = \frac{p}{4}$

$P = 2 \times \frac{1}{4} \times 4$

P = 2

5. Let $x^2 - 6x + 10 = y$

$X^2 - 6x + 10 - y = 0$

$X^2 - 6x + (10 - y) = 0$

$ax^2 + bx + c = 0$

we get

a = 1, b = -6, c = (10 – y)

for real

$D \geq 0$

$b^2 - 4ac \geq 0$

$(-6)^2 - 4 \times 1 \times (10 - y) \geq 0$

$36 - 40 + 4y \geq 0$

$4y \geq 4$

$y \geq 1$

y = {1, 2, 3, ……………∞}

minimum value of function = 1

6. If p and q are the roots of the equation $x^2 - bx + c = 0$

Then

$p + q = \frac{-b}{a} = \frac{(-b)}{1} = b$

$p.q = \frac{c}{a} = \frac{c}{1} = c$

new roots are (pq + p + q) & (pq – p – q) sum of new roots (s) = (pq + p + q+ + (pq – p – q)

= pq + p + q + pq – p – q

= 2pq

= 2c

Product of roots (p) = (pq + p + q) (pq – p – q)

= [pq + (p + q)] [pq –(p + q)]

= $(pq)^2 – (p + q)^2$

= $(c^2 – b^2)$

Now quadratic equation is

$X^2 – sx + p = 0$

$X^2 – 2cx + c^2 – b^2 = 0$

7. Say, α, β are the roots of quadratic equation then as per given conditions, we have

A.M = $\frac{\alpha+\beta}{2} = 8$

= α + β = 16 (i.e sum of roots)

And given

G.M = $\sqrt{\alpha.\beta} = 5$

= α.β 25 (i.e product of roots)

Required quadratic equation is :-

X^2 – (sum of roots) x + (product of roots) = 0

$X^2 – 16x + 25 = 0$

8. The equation of lines are

4x – 3y = 1 …………………(1)

And 2x – 5y = -3 ………………….(2)

Solving these equation (1) & (2) we get

X = 1 and y = 1

Intersection point of lines are (1, 1)

The equation of line parallel to given line

4x + 5y = 6 is given

By 4x + 5y = 8 …………………..(1)

It is passing through (1, 1) then from equation (1)

We can say that

The equation of parallel line is

4x + 5y = 9

4x + 5y – 9 = 0

9. If |x - 2| + |x -3|= 7

If $x - 2 \geq 0$ and $x - 3 \geq 0$

$(x - 2) + (x - 3) = 7$

$X - 2 + x - 3 = 7$

$2x = 7 + 2 + 3$

$2x = 12$

$X = 6$

If $x - 2 < 0$ & $x - 3 < 0$

$-(x - 2) - (x - 3) = 7$

$- x + 2 - x + 3 = 7$

$- 2x = 2 \quad x = -1$

10. Given equation

$2x^2 + 3x + 7 = 0$

On comparing with

$ax^2 + bx + c = 0$

we get,

$a = 2, b = 3, c = 7$

if α, β are the roots of Q.E then

$\alpha + \beta = \frac{-b}{a} = \frac{-3}{2}$

$\alpha . \beta = \frac{c}{a} = \frac{7}{2}$

$\alpha\beta^{-1} + \beta\alpha^{-1} = \frac{\alpha^2+\beta^2}{\alpha\beta} + \frac{(\alpha+\beta)^2}{\alpha} \frac{2\alpha\beta}{\beta}$

$= \frac{\left(\frac{-3}{2}\right)^2 - 2\left(\frac{7}{2}\right)}{\frac{7}{2}}$

$= \frac{-19}{14}$

DPP-NO-3B

1. Let the present age of grand father = x
   The present age of sum of grand sons = y
   1^{st} condition:
   X = 3y + 8 ………………………….(1)
   After 8 years
   The age of grand father = x + 8
   The age of sum of grand sons = y + 16
   2^{nd} condition:
   (x + 8) = 2 (y + 16) + 10 ………………………..(2)
   3y + 8 + 8 = 2y + 32 + 10 [from equation (1)]
   3y + 16 = 2y + 42
   Y = 42 – 16
   Y = 26 in equation (1)
   X = 3 × 26 + 8
   = 78 + 8
   = 86
   Both grand son's are twins so their age = $\frac{26}{2}$ = (13)
   The age of grand father when his grand sons was born
   = 86 – 13
   = 73

2. $X^3 - 7x + 6 = 0$
   $X^3 - x^2 + x^2 - 7x + 6 = 0$
   $X^2 (x - 1) + x^2 - x - 6x + 6 = 0$
   $X^2 (x - 1) + x (x - 1) - 6 (x - 1) = 0$
   $(x - 1) (x^2 + x - 6) = 0$
   $(x - 1) (x^2 + 3x - 2x - 6) = 0$
   $(x - 1) [x(x + 3) - 2 (x + 3)] = 0$
   $(x - 1) (x + 3) (x - 2) = 0$
   If x – 1 = 0 if x + 3 = 0 if x – 2 = 0
   X = X = 1 X= - 3 X = 2

3. Given quadratic equation
   $4x^2 - 12x + k = 0$
   Comparing from

$ax^2 + bx + c = 0$

we get a = 4, b = -12, c = k

since roots are equal

D = 0

$b^2 - 4ac = 0$

$b^2 = 4ac$

$(-12)^2 = 4 \times 4 \times k$

144 = 16k

K = 9

4. Given lines

 $3x - y = 2$ ______________(1)

 $2x + y = 3$ _____________(2)

 Solving eq. (1) & (2) we get x = 1, y = 1

 Inter section points of lines is (1, 1)

 Since all lines are concurrent so (1, 1) lies on third lines.

 Third line is

 $5x + ay = 3$

 (1, 1) lies on the line

 $5 \times 1 + a \times 1 = 3$

 $5 + a = 3$

 A = -2

5. Given lines y = 3 __________(1)

 $X + y = 0$ ______________(2)

 Solving (1) & (2) we get

 X = -3, y = 3

 Inter section points of lines is (-3, 3)

 Given lines $2x - y = 4$

 It parallel lines equation

 $2x - y = k$ ____________(A)

 It is passing through (-3, 3)

 $2(-3) - 3 = k$

 $-6 - 3 = k$

 Putting k = -9 in equation (A) then $2x - y = -9$

 $2x - y + 9 = 0$

6. Given $\alpha + \beta = -2$, and $\alpha\beta = -3$

Q.E. is

X^2 – (sum of roots) x + product of roots = 0

$X^2 - (\alpha + \beta)x + \alpha\beta = 0$

$X^2 - (-2)x + (-3) = 0$

$X^2 + 2x - 3 = 0$

7. Given quadratic equation

   $X^2 + x + 5 = 0$

   If α & β are the roots of quadratic equation

   $\alpha + \beta = \frac{-b}{a} = \frac{-1}{1} = -1$

   $\alpha.\ B = \frac{c}{a} = \frac{5}{1} = 5$

   $\frac{\alpha^2}{\beta} + \frac{\beta^2}{\alpha} = \frac{\alpha^3+\beta^3}{\alpha\beta} = \frac{(\alpha+\beta)^3-3\alpha\beta(\alpha+\beta)}{\alpha\beta}$

   $= \frac{(-1)^3-3\times5\times(-1)}{5}$

   $= \frac{-1+15}{5}$

   $= \frac{14}{5}$

8. $\frac{3}{x+y} + \frac{2}{x-y} = -1$ ___________(1)

   And $\frac{1}{x+y} - \frac{1}{x-y} = \frac{4}{3}$ ___________(2)

   Solving (1) & (2), we get (1, 2) by (hits/ trials method)

9. Given cubic equation

   $X^3 + 7x^2 - 21x - 27 = 0$

   By hits/trial -1, 3, -9 are satisfied cubic equation

   So, roots of cubic equation are -1, 3, -9.

10. If α, β are the roots of Q.E

    $X^2 - 7x - 9 = 0$

    Comparing from $ax^2 + bx + c = 0$

    We get a = 1, b = -7, c = -9

    Then $\alpha + \beta = \frac{-b}{a} = \frac{-(-7)}{1} = 7$

    $\alpha.\beta = \frac{c}{a} = \frac{-9}{1} = -9$

    $\alpha - \beta = \sqrt{(\alpha+\beta)^2 - 4\alpha\beta}$

    $= \sqrt{(7)^2 - 4 \times (-9)}$

    $= \sqrt{49 + 36}$

    $= \sqrt{85}$

DPP-NO-3C

1. Points are (k, 1) (5, 5) and (10, 7)

   $X_1 = k, x_2 = 5, x_3 = 10$

   $Y_1 = 1, y_2 = 5, y_3 = 7$

   Point are collinear then area of Δ = 0

   Area of $\Delta = \frac{1}{2}[x_1 (y_1 - y_3) + x_2 (y_3 - y_1) + x_3 (y_1 - y_2)]$

   $0 = \frac{1}{2}[k(55 - 7) + 5 (7 - 1) + 10(1 - 5)]$

   0 = [k (-2) + 5(6) + 10 (-4)]

   0 = -2k + 30 - 40

   0 = -2k – 10

   -2k = 10

   K = -5

2. Let the side of equilateral triangle is x

   In Δ ABC

   $(\text{hypo})^2 = (\text{Base})^2 + (\text{per})^2$

   $(x - 3)^2 = (x - 4)^2 + (x - 5)^2$

   $X^2 + 9 - 6x = x^2 + 16 - 8x + x^2 + 25 - 10x$

   $X^2 - 18x + 41 + 6x - 9 = 0$

   $X^2 - 12x + 32 = 0$

   $X^2 - 8x - 4x + 32 = 0$

   X(x – 8) – 4 (x – 8) = 0

   (x – 8) (x – 4) = 0

   X – 8 = 0 if x – 4 = 0

   X = 8 and x = 4 impossible

   Side of the triangle is 8.

3. Given Q.E

   $X^2 + x + 5 = 0$

   a = 1, b = 1, c = 5

   if α & β are the root of Q.E

   $\alpha + \beta = \frac{-b}{a} = \frac{-1}{1} = -1$

   $\alpha . \beta = \frac{c}{a} = \frac{5}{1} = 5$

   $\frac{\alpha^2}{\beta} + \frac{\beta^2}{\alpha} = \frac{\alpha^3 + \beta^3}{\alpha\beta}$

   $\frac{(\alpha+\beta)^3 - 3\alpha\beta(\alpha+\beta)}{\alpha\beta}$

$\frac{(-1)^3-3\times5\times(-1)}{5}$

$\frac{-1+15}{5}$

$\frac{14}{5}$

4. If $|A| = 0$ then A is singular Matrix.

5. If A & B are two matrices then $AB \neq BA$

6. Transpose of a rectangular matrix is a rectangular matrix.

7. If $\alpha + \beta = -2$ & $\alpha.\beta = -3$
   Q.E is
   $X^2 - (\alpha + \beta)x + \alpha.\beta = 0$
   $X^2 - (-2)\,x + (-3) = 0$
   $X^2 + 2x - 3 = 0$

8. If $2^{x+y} = 2^{2x-y} = \sqrt{8}$
   $2^{x+y} = \sqrt{8}$
   $2^{x+y} = (2^3)^{1/2}$
   $2^{x+y} = 2^{3/2}$
   On comparing
   $X + y = \frac{3}{2}$ -------------------(1)
   Add : (1) & (2)
   $X + y = \frac{3}{2}$ -------------------(1)
   $2x - y = \frac{3}{2}$ -------------------(2)
   $3x = 3$
   $X = 1$
   Putting x = 1 in equation (1) weg
   $X + y = \frac{3}{2}$
   $1 + y = \frac{3}{2}$ => $y = \frac{1}{2}$
   $X = 1,\ y = \frac{1}{2}$

9. Given equation
   $X + 2y = 3$ -----------(1)
   $2x - y = 1$ -----------(2)

Y = 0 -------------------(3)

Slope of line (1) is

$$m_1 = \frac{coefficient\ of\ x}{coefficient\ of\ y} = \frac{-1}{2}$$

$slope\ of\ line\ (2) is$

$$m_2 = \frac{coefficient\ of\ x}{coefficient\ of\ y} = \frac{-2}{-1} = 2$$

$m_1 \times m_2 = -\frac{1}{2} \times 2$

$m_1 \times m_2 = -1$

both lines are 1 or to each

triangle are also perpendicular

10. Let two numbers are x & y

Given x + y = 13 ----------(1)

$X^2 + y^2 = 85$ --------------(2)

From equation (1)

X + y = 13

Putting y = 13 – x in equation (2)

$X^2 + (13 - x)^2 = 85$

$X^2 + 169 + x^2 - 26x = 85$

$2x^2 - 26x + 169 - 85 = 0$

$2x^2 - 26x + 84 = 0$

$2(x^2 - 13x + 42) = 0$

$X^2 - 13x + 42 = 0$

$X^2 - 7x - 6x + 42 = 0$

X(x – 7) – 6 (x – 7) = 0

(x – 7) (x – 6) = 0

If x – 7 = 0 if x – 6 = 0

X = 7 x = 6

Putting x = 7 in equation (1) we get y = 6

Putting x = 6 in equation (2) we get x = 7

DPP-NO-7A

1. Given :- sum of n – terms of an A.P
   i.e $S_n = 2n^2 + n$
   $S_{n-1} = 2(n-1)^2 + (n-1)$
   Or $S_{n-1} = 2n^2 - 3n + 1$
   n^{th} term of this A.P will be
   $T_n = S_n - S_{n-1}$
   $= (2n^2 + n) - (2n^2 - 3n + 1)$
   $T_n = 4n - 1$
   First term $(T_1) = 4(1) - 1 = 3$
   & tenth term $(T_{10}) = 4(10) - 1 = 39$
   By question required difference
   $= T_{10} - T_1$
   $= 39 - 3$
   $= 36$

2. Product (P) $= (243) \times (243)^{1/6} \times (243)^{1/36} \times \ldots\ldots\ldots\infty$
   $= 1 + \frac{1}{6} + \frac{1}{36} + \cdots \ldots \ldots \infty$
   $= (243)$
   $= (243)^{\frac{1}{(1-\frac{1}{6})}} \left(in\ GPS_\infty = \frac{a}{1-r}\right)$
   $= (243)^{6/5}$
   $= (3^6)^{6/5}$
   $= 3^6$
   $= 729$

3. Let A_1 A_2, be the two Arithmetic Means between 68 and 260
   68, A_1, A_2, 260 are in A.P
   Here,
   First term (a) = 68
   Last term (l) = 260
   Total no. of terms = 4
   We know, $l = a + (n-1)d$
   $260 = 68 + (4-1)\,d$
   D = 64
   $A_1 = a + d = 68 + 64 = 132$

4. Given P, P^2, P^3,……….P^n

G.M = $[P \times P^2 \times P^3 \times ……….\times P^n]^{1/n}$

$= [P^{(1+2+------+n)}]^{1/n}$

$= \left[P^{\frac{n(n+1)}{2}}\right]^{1/n}$

$= P^{\frac{n(n+1)}{2}}$

5. Let a be the first term of A.P and T_n = n^{th} term of A.P and be the common ratio of A.P series

$T_n = a + (n – 1) d$

$T_8 = a + (8 – 1) d = 15$

a + 7d = 15 ……………………..(i)

the sum of n term

$S_n = \frac{n}{2}[2a + (n-1)d]$

$S_{15} = \frac{15}{2}[2a + (15-1)d]$

$= \frac{15}{2}[2a + 14d]$

$= \frac{15}{2} \times 2(a + 7d)$

= 15 × 15 [from eq.(i)]

= 225

6. Say 'a' be the first term and 'd' e the common difference of A.P

Given $T_4 = 3T_1$ and $T_7 = 2T_3 + 1$

a + 3d = 3(a)

⇨ 2a = 3d ……………(1)

And $T_7 = 2T_3 + 1$

a + 6d = 2(a = 2d) + 1

a = 2d – 1 …………………….(2)

solving (1) and (2) we get

2(2d – 1) – 3d = 0

d = 2

putting d = 2 in (2) we get

a = 2(2) – 1

a = 3

7. In A.P, common difference (d) = 2

Sum of n terms (S_n) = 49

7^{th} term T_7 = 13

We know that,

$T_n = a + (n - 1)\, d$

$T_7 = a + (7 - 1) \times 2$

$T_7 = a + 6 \times 2$

$13 = a + 12$

$a = 13 - 12 = 1$

$S_n = \frac{n}{2}[2a + (n-1)d]$

$49 = \frac{n}{2}[2 \times 1 + (n-1)2]$

$49 = \frac{n}{2} \times 2[1 + n - 1]$

$49 = n^2$

$n = \sqrt{49} = 7$

8. Let first term of G.P is 'a' and common ratio is 'r'

$T_2 = ar^{2-1}$ [$\therefore T_n = ar^{n-1}$]

$2 = ar$ ______________(1)

$S\alpha = \frac{a}{1-r}$

$8 = \frac{a}{(1-r)}$

$a = 8\,(1 - r)$ ______________(2)

putting the value of a in eq (i)

$2 = 8\,(1 - r).r$

$2 = 8r - 8r^2$

$8r^2 - 8r + 2 = 0$

$4r^2 - 4r + 1 = 0$

$4r^2 - 2r - 2r + 1 = 0$

$2r\,(2r - 1) - 1\,(2r - 1) = 0$

$(2r - 1)\,(2r - 1) = 0$

If $2r - 1 = 0$

$R = ½$ in eq (i)

$2 = a \times \frac{1}{2}$

$a = 4$

9. Let Ist term of G.P is a and common ratio is r

Given $T_6 = 729$ common ratio (r) = 3

$ar^{6-1} = 729$

$ar^5 = 729$

$a(3)^5 = 729$

$a \times 243 = 729$

$a = \frac{729}{243}$

$a = 3$

10. Given

I + II + III + ………………….. m terms

$= \frac{1}{9}$[9 + 99 + 999 + ………………….. m terms]

$= \frac{1}{9}$[(10 – 1) + (100 – 1) + (1000 – 1) + …………….m terms]

$= \frac{1}{9}$[(10 + 100 + 1000 + ……………………….m terms) – (1 + 1 + 1 + ……………………..m terms)]

$= \frac{1}{9}\left[\frac{10(10^m-1)}{10-1} - m\right]$

$= \frac{1}{9}\left[\frac{10}{9}(10^m - 1) - m\right]$

$= \frac{1}{81}(10^{m+1} - 10 - 9m))]$

$= \frac{1}{81}(10^{m+1} - 9m - 10)$

DPP-NO-7B

1. $1+\frac{1}{3}+\frac{1}{9}+\frac{1}{27}+\cdots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..\infty$

   a = 1, r = $\frac{\frac{1}{3}}{1}=\frac{1}{3}<1$

   $S_\infty=\frac{a}{1-r}$

   $=\frac{1}{1-\frac{1}{3}}$

   $=\frac{1}{2}$

   $=\frac{3}{2}$

   $=1.5$

2. $1^3+2^3+3^3+\ldots\ldots\ldots\ldots\ldots\ldots+m^3$

   $=\sum m^3$

   $=\left[\frac{m(m+1)}{2}\right]^2$

3. If x, y, z are in G.P

   Then x = 1, y = 2, z = 4

   $X^2+y^2, xy+yz, y^2+z^2$

   $=1^2+2^2, 1\times 2+2\times 4, 2^2+4^2$

   = 5, 10, 20 are in G.P

4. If S = n^2p ans $S_m=m^2p$ find S_p = ?

   Now,

   $S=\frac{n}{2}[2a+(n-1)d]$

   $n^2p=\frac{n}{2}[2a+(n-1)d]$

   $\frac{2n^2p}{n}=2a+nd-d$

   2a + nd – d = 2np _____________(1)

   And $S_m=\frac{m}{2}[2a+(m-1)d]$

   $m^2p=\frac{m}{2}[2a+md-d]$

   $\frac{2m^2p}{m}=2a+md-d$

   $2a+md-d=2mp$ ______________(2)

   Equation (1) – equation (2)

   2a + nd – d = 2np

   $2a+md-d=2mp$

- - + -

---

nd – md = 2np – 2mp

d (n – m) = 2p (n – m)

d = 2p

d = 2p in equation (1)

2a + m. 2p – 2p = 2mp

2a = 2mp – 2mp + 2p

2a = 2p

a = p

the sum of p term of A.P

$S_p = \frac{p}{2}$ [2a + (p -1) d]

$= \frac{p}{2}$ [2.p + (p – 1) 2p]

$= \frac{p}{2}[2p + 2p^2 - 2p]$

$= \frac{p}{2}. 2p^2$

$= p^3$

5. We know,

Sum of squares of first, 'n' natural nos. is

$S_n = \frac{n}{6}(n + 1)(2n + 1)$

So for '2n' natural numbers.

Replacing n by 2n in above formula, we get,

$S_{2n} = \frac{2n}{6}(2n + 1)(2(2n) + 1)$

$= \frac{n}{3}(2n + 1)(4n + 1)$

Mean of '2n' natural nos. = $\overline{x}_{2n} = \frac{S_{2n}}{2n}$

$= \frac{\frac{n}{3}(2n+1)(4n+1)}{2n}$

= 1/6 (2n + 1) (4n + 1)

6. Given ,

$S_n = 6n^2 + 6n$

$S_{n-1} = 6(n-1)^2 + 6(n-1)$

$= 6(n^2 + 1 - 2n) + 6n - 6$

$= 6n^2 + 6 - 12n + 6n - 6$

$= 6n^2 - 6n$

$T_n = S_n - S_{n-1}$

$T_n = (6n^2 + 6n) – (6n^2 – 6n)$

$T_n = 6n^2 + 6n – 6n^2 + 6n$

$T_n = 12n$

Fourth term

$T_4 = 12 \times 4 = 48$

7. If 'S' be the sum, 'P' the product and 'R' the sum of reciprocals of n terms in G.P then

   P is the G.M of S^n and R^n

   $P^2 = S^n , R^{-n}$

   $P^2 = \frac{S^n}{R^n}$

   $P^2R^n = S^n$

8. Given

   $1 + 11 + 111 + ... \text{ to n terms}$

   $= \frac{1}{9}[9 + 99 + 999 + ... \text{ to n terms}]$

   $= \frac{1}{9}[(10 – 1) + (100 – 1) + (1000 – 1) + ...\text{to n terms}]$

   $= \frac{1}{9}[(10 + 100 + 1000 + ...\text{n terms}) – (1 + 1 + 1 + ...\text{n terms})]$

   $= \frac{1}{9}\left[\frac{10(10^n-1)}{10-1} - n\right]$

   $= \frac{1}{9}\left[\frac{10^{n+1}-10}{9} - n\right]$

   $= \frac{1}{9}\left[\frac{10^{n+1}-10-9n}{9}\right]$

   $= \frac{1}{81}(10^{n+1} – 9n – 10)$

9. Given $S_n = 3n^2 + 5n$

   Putting $n = 1, S_1 = 3(1)^2 + 5(1) = 3 + 5 = 8$

   $n = 2, S_2 = 3(2)^2 + 5(2) = 12 + 10 = 22$

   $S_3 = 3(3)^2 + 5(3) = 27 + 15 = 42$

   Then,

   $T_1 = S_1 = 8$

   $T_2 = S_2 – S_1 = 22 – 8 = 14$

   $T_3 = S_3 – S_2 = 42 – 22 = 20$

   A.P series is

   8, 14, 20, ...

   $a = 8, d = 14 – 8 = 6, T_m = 164$

   $T_m = a + (m – 1) d$

$164 = 8 + (m - 1) \times 6$

$164 = 8 + 6m - 6$

$6m = 164 + 6 - 8$

$6m = 162$

$m = \frac{162}{6}$

$m = 27$

10. If a, b, c are in A.P

    Then $a = 1$, $b = 2$, $c = 3$

    $= a - b + c$

    $= 1 - 2 + 3$

    $= 4 - 2$

    $= 2$

DPP-NO-7C

1. Let two number a and b

A.M = $\frac{a+b}{2}$

7.5 = $\frac{a+b}{2}$

a + b = 15 ______(1)

G.M = $\sqrt{ab}$

5 = $\sqrt{ab}$

25 = ab _________(2) (on squaring both side)

Solving (1) and (2) we get

a = 13.09 and b = 1.91

2. Given series

Log x + $\log\frac{x^2}{y} + \log\frac{x^3}{y^2}$ + ………………………….. n terms

First term (a) = log x

Common difference (d) = $T_2 - T_1$

$= \log\left(\frac{x^2}{y}\right) - \log x$

$= \log\left(\frac{x^2}{y.x}\right)$

$= \log\left(\frac{x}{y}\right)$

Sum of n terms of A.P

$S_n = \frac{n}{2}[2a + (n-1)d]$

$= \frac{n}{2}[2.\log x + (n-1)\log\left(\frac{x}{y}\right)]$

$= \frac{n}{2}[2\log x + n\log\left(\frac{x}{y}\right) - \log\left(\frac{x}{y}\right)]$

$= \frac{n}{2}[n\log x + 2\log x - \log\left(\frac{x}{y}\right)]$

$= \frac{n}{2}[n\log x + \log x^2 + \log\left(\frac{y}{x}\right)]$

$= \frac{n}{2}[n\log\left(\frac{x}{y}\right) + \log\left(x^2.\frac{y}{x}\right)]$

$= \frac{n}{2}[n\log\frac{x}{y} + \log xy]$

3. If $\frac{1}{b+c}, \frac{1}{c+a}, \frac{1}{a+b}$ are in arithmetic progression then

$\frac{1}{c+a} - \frac{1}{b+c} = \frac{1}{a+b} - \frac{1}{c+a}$

$\frac{b+c-c-a}{(c+a)(b+c)} = \frac{c+a-a-b}{(a+b)(c+a)}$

$\frac{(b-a)}{b+c} = \frac{(c-b)}{(b+a)}$

(b – a) (b + a) = (c – b) (c + b)

$b^2 - a^2 = c^2 - b^2$

$b^2 + b^2 = c^2 + a^2$

$2b^2 = c^2 + a^2$

a^2, b^2, c^2 are in A.P

4. Given a = 5, 00, 000, d = 15, 000, n = 10

   Total amount after n years

   $S_n = \frac{n}{2}[2a + (n-1)d]$

   $S_{10} = \frac{10}{2}[2 \times 5{,}00{,}000 + (10-1) \times 15{,}000]$

   = 5[10,00,000 + 9 × 15,000]

   = 5[10,00,000 + 1, 35, 000]

   = 5[11,35,000]

   = 56,75,000

5. Given series 50 + 45 + 35 + __________ n terms

   First term (a) = 50

   Common difference (d) = 45 – 50 = -5

   Sum of n terms $S_n = 0$

   $S_n = \frac{n}{2}[2a + (n-1)d]$

   $0 = \frac{n}{2}[2 \times 50 + (n-1)(-5)]$

   $\frac{2}{n} \times 0 = 100 - 5n + 5$

   $0 = 105 - 5n$

   5n = 105

   $N = \frac{105}{5} = 21$

6. $S_n = 975$, a = 100, d = -5, n = ?

   $S_n = \frac{n}{2}[2a + (n-1)d]$

   $975 = \frac{n}{2}[2 \times 100 + (n-1)(-5)]$

   1,950 = n[200-5n+5]

   1,950 = n [205 – 5n]

   $1950 = 205n - 5n^2$

   $5n^2 - 205n + 1950 = 0$

$5(n^2 - 41n + 390) = 0$

$n^2 - 41n + 310 = 0$

$n^2 - 26n - 15n + 390 = 0$

$n(n - 26) - 15(n - 26) = 0$

$(n - 26)(n - 15) = 0$

If $n - 15 = 0$ if $n - 26 = 0$

$n = 15$ $n = 26$

the entre amount will be paid in 15 months

7. If a, -3, b, 5, c are in A.P

Now -3, b, 5 are in A.P

$b - (-3) = 5 - b$

$b + 3 = 5 - b$

$b + b = 2$

$2b = 2$

$b = 1$

and b, 5, c are in A.P

$5 - b = c - 5$

$5 - 1 = c - 5$

$4 = c - 5$

$c = 4 + 5$

$c = 9$

8. Number b/w 10 and 1000 which are divisible by 11 are 110, 121, 132, -----------, 990

Here, $a = 110$, $d = 121 - 110 = 11$, $l = 990$

Then, $n = \frac{l-a+d}{d} = \frac{990-110+11}{11} = \frac{891}{11} = 81$

Sum of n term of A.P

$S_n = \frac{n}{2}[2a = (n-1)d]$

$S_n = \frac{81}{2}[2 \times 110 + (81-1)11]$

$= \frac{81}{2}[220 + 80 \times 11]$

$= \frac{81}{2}[220 + 880] = 44550$

9. Given,

$S_n = (3n^2 - n)$

$n = 1$

$S_1 = 3(1)^2 - 1 = 3 - 1 = 2$

$n = 2$, $S_2 = 3(2)^2 - 1 = 12 - 1 = 11$

$n = 3$, $S_3 = 3(3)^2 - 1 = 27 - 1 = 26$

$T_1 = S_1 = 2$

$T_2 = S_2 - S_1 = 11 - 2 = 9$

$T_3 = S_3 - S_2 = 26 - 11 = 15$

First term of series = $T_1 = 2$

10. Let first term and common difference of A.P is a and d

Given $T_4 + T_{12} = 8$

$a + 3d + a + 11d = 8$

$2a + 14d = 8$

$S_{15} = \frac{15}{2}[2a + (15-1)d]$ $\{S_n = \frac{n}{2}[2a + (n-1)d]\}$

$S_{15} = \frac{15}{2}[2a + 14d] = \frac{15}{2} \times 8^4 = 60$

DPP-NO-8A

1. No. of different word can be formed from the letters of 'LIBERTY'
   = 7!
   = 5040

2. No. of ways can a family consist of three children have different birthday in a leap years = $366 \times 365 \times 364$

3. If ${}^{1000}C_{98} = {}^{999}C_{97} + {}^{x}C_{901}$
   By properties ${}^{n}C_{r} + {}^{n}C_{r-1} = {}^{n+1}C_{r}$
   ${}^{999}C_{97} + {}^{x}C_{901} = {}^{1000}C_{98}$ ……………………(1)
   ${}^{999}C_{97} + {}^{999}C_{98} = {}^{999+1}C_{98}$
   ${}^{999}C_{97} + {}^{999}C_{98} = {}^{1000}C_{98}$
   ${}^{999}C_{97} + {}^{999}C_{999-98} = {}^{1000}C_{98}$
   ${}^{999}C_{97} + {}^{999}C_{901} = {}^{1000}C_{98}$ ……………………….(2)
   Comparing (1) & (2) we get
   X = 999

4. The no. of permutation of 'n' item taken 3 at a time = ${}^{n}C_{3}$
   The no. of permutation of 'n -1' item taken at a time = ${}^{n-1}C_{3}$
   Given
   $6.{}^{n}C_{3} = 7\ {}^{n-1}C_{3}$
   $6.\frac{\lfloor n}{\lfloor n-3} = 7\ \frac{\lfloor n-1}{\lfloor n-1-3}$
   $6 \times = \frac{n\lfloor n-1}{n-3\lfloor n-4} 7\ \frac{\lfloor n-1 \quad \Rightarrow 6n=7n-21}{\lfloor n-4 \quad \Rightarrow n=21}$

5. If ${}^{6}P_{r} = 360$
   $\frac{6!}{(6-r)!} = \frac{360}{1}$
   360. (6 – r)! = 6!
   360. (6 – r)! = 720
   $(6-r)! = \frac{720}{360}$
   (6 – r)! = 2
   (6 – r) ! = 2!
   On comparing 6 – r = 2
   r = 4

6. No. of English Book = 5

No. of Tamil Book = 4

No. of Hindi Book = 3

E_1 E_2 E_3 E_4 E_5	T_1 T_2 T_3 T_4	H_1 H_2 H_3
1	2	3

No. of ways = 5! × 4! × 3! × 3! = 1, 03,680

7. Total men = 5, total women = 4

OE OE OE OE O

1 2 3 4

No. of ways = $^4p_4 \times 5!$

= 4! × 5!

= 24 × 120

= 2,880

8.

		Th		H		T		U	
1	(3)	1	×	6	×	5	×	4	= 120
2	(5)	1	×	6	×	5	×	4	= 120
3	(7)	1	×	6	×	5	×	4	= 120
5	(8)	1	×	6	×	5	×	4	= 120
7	(9)	1	×	6	×	5	×	4	= 120
8									
9									
Total No. of ways									= 600

9. Total Friend = 10

No. of Relative = 6

No. of friend = 4

No. of ways to invite five guest such that three of them are his relatives

= $^6C_3 \times {}^4C_2$

= $\frac{6\times5\times4}{3\times2\times1} \times \frac{4\times3}{2\times1}$

= 20 × 6

= 120

10. Total question = 10

No. of Mathematics questions = 6

No. of Statistics questions = 4

No. of ways at least one question of mathematics = $(2^6 – 1) = (64 – 1) = 63$

No. of ways at least one question of statistics = $(2^4 – 1) = (16 – 1) = 15$

Total no. of ways = $63 \times 15 = 945$

DPP-NO-8B

1. No. of arrangement when one particular thing is always taken is given by r. ${}^{n-1}P_{r-1}$
   Here, n = 12 r = 5
   5 ${}^{12-1}P_{5-1}$ = 39,600

2. No. of ways = ${}^{n}P_{r}$
   Here n = 5, r = 3
   = ${}^{5}P_{3}$
   = $\frac{\lfloor 5}{\lfloor 5-3}$
   = $\frac{5\times4\times3\lfloor 2}{\lfloor 2}$
   = 60

3. No. of ways = n^r = 2^{12} = 4,096

4. In word "VIOLENT"
   No. of vowel = 3 (I, O, E)
   No. of consonant = 4 (V, L, N, T)
   Total no of letter = 7
   OEOEOEO O → Odd
   E → Even
   There are 3 even places and 4 Odd places so 3 vowels can fill in 3 even places and 4 consonant can fill in 4 Odd places. Then total number of ways
   = ${}^{3}P_{3}$ ${}^{4}P_{4}$
   = 3! × 4!
   = 6 × 24
   = 144

5. Given ${}^{n}P_{4}$ = 20. ${}^{n}P_{2}$
   $\frac{\lfloor n}{\lfloor n-4} = 20.\frac{\lfloor n}{\lfloor n-2}$
   Or (n – 2) (n – 3) = 20
   Or n^2 – 5n – 14 = 0
   n^2 – 7n + 2n – 14 = 0
   n(n – 7) + 2(n – 7) = 0
   n = 7 or n = -2 (not possible)

6. Total school (n) = 6

   No. of son (r) = 3

   No. of ways = ^nP_r = $^6P_3$

7. Words 'DRAUGHT'

   If both vowels may not be separated this mean that both vowels comes together

   D R G H T   A U

   6 5 4 3 2   1

   No. of ways if two vowels comes together

   = 6! × 2! = 720 × 2 = 1,440

8. If $^{13}C_6 + 2\,^{13}C_5 + ^{13}C_4 = ^{15}C_x$

   $(^{13}C_6 + ^{13}C_5) + (^{13}C_5 + ^{13}C_4) = ^{15}C_x$

   $^{14}C_6 + ^{14}C_5 = ^{15}C_x$ $[^nC_r + ^nC_{r-1} = ^{n+1}C_r]$

   $^{15}C_6 = ^{15}C_x$

   On comparing, x = 6

9. Let number of side of polygon is n

   No. of diagonal = $\frac{n(n-3)}{2}$

   $\frac{44}{1} = \frac{n^2-3n}{2}$

   $88 = n^2 - 3n$

   $n^2 - 3n - 88 = 0$

   $(n - 11)(n + 8) = 0$

   If n – 11 = 0 if n + 8 = 0

   n = 11   n = -8 (not valid)

10. In the word 'ARTICLE'

    Total vowels = A, I, E (3)

    Total consonant = R, T, C, L (4)

    O E O E O E O

    No. of ways = $^3P_3 \times 4!$

    = 3! × 4!

    = 6 × 24

    = 144

DPP-NO-9A

1. Given f(x) = $^xC_3$

$= \frac{\lfloor x}{\lfloor 3 \lfloor x-3}$

F(x) = $\frac{(x^3-3x^2+2x)}{6}$

Differentiating w.r.t (x) both the sides, we get

$f^1(x) = \frac{1}{6}(3x^2 - 6x + 2)$

$f^1(1) = \frac{1}{6}(3 \times 1^2 - 6 \times 1 + 2)$

$f^1(1) = \frac{-1}{6}$

2. If $y = x^x$

Taking log on both side

Log y = log x^x

Log y = x log x

Diff w. r. t (x)

$\frac{1}{y}\frac{dy}{dx} = x\frac{1}{x} + \log x.1$

$\frac{1}{y}\frac{dy}{dx} = 1 + \log x$

$\frac{dy}{dx}$ = y (1 + log x)

Diff again w. r. t ‘x’

$\frac{d}{dx}\left(\frac{dy}{dx}\right) = \frac{d}{dx}\{y(1 + \log x)\}$

$= y.\frac{d}{dx}(1 + \log x) + (1 + \log x)\frac{dy}{dx}$

$= (1 + \log x)\frac{dy}{dx} + y.\frac{d}{dx}(1 + \log x)$

$= \frac{dy}{dx}(1 + \log x) + y.\frac{d}{dx}(1 + \log x)$

3. $y = e^{a \log x} + e^{x \log a}$

$y = e^{\log x^a} + e^{\log a^x}$

$y = x^a + a^x$

$[e^{\log m} = m]$

Diff w. r. t (x) both the sides we get

$\frac{dy}{dx} = a\,x^{a-1} + a^x \log a$

4. Given

   $y = x^3 - 3x$

   diff w. r. t 'x'

   $\frac{dy}{dx} = 3x^2 - 3$ ____________(1)

   $0 = 3(x^2 - 1)$

   $X^2 - 1 = 0$

   $X^2 = 1$

   $X = \pm 1$

   Diff (1) w. r. t 'x'

   $\frac{d^2y}{dx^2} = \frac{d}{dx}(3x^2 - 3)$

   $\frac{d^2y}{dx^2} = 6x$

   $\left(\frac{d^2y}{dx^2}\right)_{(x=\pm 1)} = 6(\pm 1) = \pm 6$

5. Given curve

   $F(x) = x^3 - 2x + 3$

   i.e $y = x^3 - 2x + 3$

   $\frac{dy}{dx} = \frac{d}{dx}(x^3 - 2x + 3)$

   $\frac{dy}{dx} = 3x^2 - 2$

   $\left(\frac{dy}{dx}\right)_{(2,7)} = 3(2)^2 - 2$

   $= 12 - 2$

   $\left(\frac{dy}{dx}\right)_{(2,7)} = 10$

   Slope of tangent $m = \left(\frac{dy}{dx}\right)_{(2,7)} = 10$

   The equation of tangent at (2, 7)

   $y - y_1 = m(x - x_1)$

   $y - 7 = 10(x - 2)$

   $y - 7 = 10x - 20$

   $y = 10x - 20 + 7$

   $y = 10x - 13$

6. Given,

y = $\log\left(\frac{5-4x^2}{3+5x^2}\right)$

y = log (5 – 4x^2) – log (3 + 5x^2)

diff w. r. t 'x'

$\frac{dy}{dx} = \frac{d}{dx}$ log (5 – 4x^2) - $\frac{d}{dx}$ (3 + 5x^2)

= $\frac{1}{(5-4x^2)}\frac{dy}{dx}(5 - 4x^2) - \frac{1}{(3+5x^2)}\frac{dy}{dx}(3 + 5x^2)$

= $\frac{-8x}{5-4x^2}\frac{1}{(5-4x^2)}(0-8x) - \frac{1}{(3+5x^2)}(0+10x)$

= $-\frac{10x}{(3+5x^2)}$

= $\frac{-8x}{4x^2-5} - \frac{10x}{(3+5x^2)}$

7. If y = $\log_y x$

y = $\frac{\log x}{\log y}$

y log y = log x

diff w. r. t x

y $\frac{1}{y}\frac{dy}{dx} + \log y.\frac{dy}{dx} = \frac{1}{x}$

$\frac{dy}{dx}(1+\log y) = \frac{1}{x}$

$\frac{dy}{dx} = \frac{1}{x(1+\log y)} = \frac{1}{(x+x\log y)}$

8. If x = log t, diff w.r.t 't'

$\frac{dx}{dt} = \frac{d}{dt}\log t = \frac{1}{t}$

And y = e^t

$\frac{dy}{dt} = \frac{d}{dt}(e^t) = e^t$

$\frac{dy}{dx} = \frac{dy/dt}{dx/dt} = \frac{e^t}{1/t} = te^t$

9. Given y = x^3 – x^2 x + 1 ……………………(i)

Diff w.r.f(x) $\frac{dy}{dx}$ = 3x^2 – 2x – 1

Since tangent is parallel to x – axis

$\frac{dy}{dx} = 0$

3x^2 – 2x – 1 = 0

3x^2 – 3x + x – 1 = 0

3x(x – 1) + 1(x – 1) = 0

(x – 1) (3x + 1) = 0

If x – 1 = 0 and if 3x + 1 = 0

X = 1 and x = -1/3

X = 1 in equation (i) we get

y = $\left(\frac{-1}{3}\right)^3 - \left(\frac{-1}{3}\right)^2 - \left(\frac{-1}{3}\right) + 1$

= $\frac{-1}{27} - \frac{1}{9} + \frac{1}{3} + 1$

= $\frac{-1-3+9+27}{27}$

y = $\frac{32}{27}$

points are (-1/3, 32/27) and (1, 0)

10. y = $1 + \frac{x}{\lfloor 1} + \frac{x^2}{\lfloor 2} + \cdots \ldots\ldots\ldots\ldots + \frac{x^n}{\lfloor n} + \cdots \ldots\ldots\ldots\ldots.. \infty$

$\frac{dy}{dx} = 0 + \frac{1}{\lfloor 1} + \frac{2x}{\lfloor 2} + \cdots \ldots\ldots\ldots\ldots + \frac{nx^{n-1}}{\lfloor n} + \cdots \ldots\ldots\ldots\ldots.. \infty$

$\frac{dy}{dx} = 1 + \frac{2x}{2\lfloor 1} + \cdots \ldots\ldots\ldots\ldots + \frac{nx^{n-1}}{n\lfloor n-1} + \cdots \ldots\ldots\ldots\ldots.. \infty$

$\frac{dy}{dx} = 1 + \frac{x}{\lfloor 1} + \frac{x^2}{\lfloor 2} + \cdots \ldots\ldots\ldots\ldots.. \infty$

$\frac{dy}{dx} = y$

$\frac{dy}{dx} - y = 0$

DPP-NO-9B

1. Given

$X^p y^q = (x + y)^{p+q}$

$\text{Log}(x^p y^q) = \log (x + y)^{p+q}$

$\text{Log}\, x^p + \log y^q = (p + q) \log (x + y)$

$p \log x + q \log y = (p + q) \log (x + y)$

diff w.r.t 'x'

$P \times \frac{1}{x} + q \times \frac{1}{y}\frac{dy}{dx} = (p+q)\frac{1}{(x+y)}\frac{d}{dx}(x+y)$

$\frac{p}{x} + \frac{q}{y}\frac{dy}{dx} = \frac{(p+q)}{(x+y)}\left[1 + \frac{dy}{dx}\right]$

$\frac{p}{x} + \frac{q}{y}\frac{dy}{dx} = \frac{p+q}{x+y}\left[\frac{p+q}{x+y}\right]\frac{dy}{dx}$

$\frac{q}{y}\frac{dy}{dx} - \left(\frac{p+q}{x+y}\right)\frac{dy}{dx} = \frac{p+q}{x+y} - \frac{p}{x}$

$\frac{dy}{dx}\left[\frac{q}{y} - \frac{(p+q)}{(x+y)}\right] = \frac{(p+q)x - p(x+y)}{(x+y)x}$

$\frac{dy}{dx}\left[\frac{q(x+y) - y(p+q)}{y(x+y)}\right] = \frac{px + qx - px - py}{(x+y)x}$

$\frac{dy}{dx}\left[\frac{qx + qy - py - qy}{y(x+y)}\right] = \frac{(qx - py)}{(x+y)x}$

$\frac{dy}{dx}\frac{(qx-py)}{y} = \frac{(qx-py)}{x}$

$\frac{dy}{dx} = \frac{y}{x}\frac{(qx-py)}{(qx-py)}$

$\frac{dy}{dx} = \frac{y}{x}$

2. $e^{xy} - 4xy = 4$

diff w.r.t 'x' on both side

$\frac{d}{dx}\left(e^{xy} - 4xy\right) = \frac{d}{dx}(4)$

$\frac{d}{dx} e^{xy} - \frac{d}{dx}(4xy) = 0$

$e^{xy} \frac{d}{dx}(xy) - 4 \frac{d}{dx}(xy) = 0$

$\frac{d}{dx}(xy) [e^{xy} - 4] = 0$

$e^{xy} - 4 = 0$

$e^{xy} = 4$

diff w.r.t 'x'

$\frac{d}{dx} e^{xy} = \frac{d}{dx}(4)$

$e^{xy} \times \frac{d}{dx}(xy) = 0$

$e^{xy} \times [x \times \frac{dy}{dx} + y.\, 1] = 0$

x $\frac{dy}{dx}$ + y = 0

$\frac{dy}{dx} = \frac{-y}{x}$

3. if u = $3t^4 + 5t^3 + 2t^2 + t + 4$

   diff w.r.t (t)

   $\frac{du}{dx} = \frac{d}{dt}(3t^4 + 5t^3 + 2t^2 + t + 4$

   $= \frac{d}{dt}(3t^4) + \frac{d}{dt}(5t^3) + \frac{d}{dt}(2t^2) + \frac{d}{dt}(t)t + \frac{d}{dt}(4)$

   = $3.4t^3 + 5.3t^2 + 2.2t + 1 + 0$

   = $12t^3 + 15t^2 + 4t + 1$

   $\left(\frac{du}{dx}\right)_{t=-}$ = $12(-1)^3 + 15(-1)^2 + 4(-1) + 1$

   = 12(-1) + 15(1) – 4 + 1

   = - 12 + 15 – 4 + 1

   = -16 + 16

   = 0

4. y = $ae^{nx} + be^{-nx}$

   diff w.r.t ‘x’

   $\frac{dy}{dx}$ = ae^{nx}. n + be^{-nx}. (-n)

   $\frac{dy}{dx}$ = n ae^{nx} – n be^{-nx}

   $diff\ w.r.t\ 'x'$

   $\frac{d^2y}{dx^2}$ = n a.e^{nx}.n – n b.e^{-nx}.(-n)

   = n^2 ($ae^{nx} + be^{-nx}$)

   $\frac{d^2y}{dx^2}$ = n^2y

5. given curve

   y = $\frac{x-1}{x+2}$

   $\frac{dy}{dx} = \frac{(x+2)\frac{d}{dx}(x-1)-(x-1)\frac{d}{dx}(x+2)}{(x+2)^2}$

   $\frac{dy}{dx} = \frac{(x+2)(1-0)-(x-1)(1+0)}{(x+2)^2}$

   $\frac{dy}{dx} = \frac{x+2-x+1}{(x+2)^2}$

   $\frac{dy}{dx} = \frac{3}{(x+2)^2}$

   $\left(\frac{dy}{dx}\right)_{(x=2)} = \frac{3}{(x+2)^2} = \frac{3}{(4)^2} = \frac{3}{16}$

Slope of tangent = $\left(\frac{3}{16}\right)$

6. if y = $\sqrt{\frac{1-x}{1+x}}$

y = $\frac{\sqrt{1-x}}{\sqrt{1+x}}$

diff w.r.t 'x'

$$\frac{dy}{dx} = \frac{\sqrt{1+x}\frac{d}{dx}\sqrt{1-x} - \sqrt{1-x}\frac{d}{dx}\sqrt{1+x}}{\left(\sqrt{1+x}\right)^2}$$

$$\frac{dy}{dx} = \frac{\sqrt{1+x}.\frac{1}{2\sqrt{1-x}}.(-1) - \sqrt{1-x}.\frac{1}{2\sqrt{1+x}}.(1)}{(1+x)}$$

$$\frac{dy}{dx} = \frac{(1+x)(-1)-(1-x).1}{2\sqrt{1-x}\sqrt{1+x}(1+x)}$$

$$\frac{dy}{dx} = \frac{-1-x-x+x}{2\sqrt{1-x^2}\,(1+x)}$$

$$\frac{dy}{dx} = \frac{2}{2\sqrt{1-x^2}\,(1+x)}$$

$$\frac{dy}{dx} = \frac{-1}{\sqrt{1-x^2(1+x)}} \cdot \frac{\sqrt{1-x^2}}{\sqrt{1-x^2}}$$

$$\frac{dy}{dx} = \frac{-1\sqrt{(1+x)(1-x)}}{(1-x^2)(1+x)}$$

$$\frac{dy}{dx} = \frac{-\sqrt{1+x}\sqrt{1-x}}{(1-x^2)\sqrt{1+x}\sqrt{1-x}}$$

$$\frac{dy}{dx} = -\sqrt{\frac{1-x}{1+x}} \cdot \frac{1}{(1-x^2)}$$

$$\frac{dy}{dx} = \frac{-y}{(1-x^2)}$$

$$\frac{dy}{dx} = \frac{y}{(x^2-1)}$$

7. given, slope = 3x – 4

$\frac{dy}{dx}$ = 3x – 4

Dy = (3x – 4) dx

On integration

$\int dy = \int (3x - 4)\,dx$

y = $\frac{3x^2}{2} - 4x + c$ ________________(1)

it passes through (1, 2) then

2 = $\frac{3(1)^2}{2} - 4 \times 1 + c$

2 = $\frac{3}{2} - 4 + c$

c = 2 + 4 -$\frac{3}{2}$

c = $\frac{9}{2}$ in equation (1)

y = $\frac{3x^2}{2} - 4x + \frac{9}{2}$

2y = $3x^2 - 8x + 9$

8. Given, x = $at^3 + bt^2 - t$ and y = $at^2 - 2bt$

$\frac{dx}{dt} = a.3t^2 + b.2t - 1$ and $\frac{dy}{dt} = 2at - 2b$

= $2at^2 + 2bt - 1$

$\frac{dy}{dx} = \frac{dy/dt}{dx/dt} = \frac{2at-2b}{3at^2+2bt-1}$

$\left(\frac{dy}{dx}\right)_{t=0}$ = $\frac{2a\times0-2b}{3a(0)^2+2b(0)-1}$

= $\frac{0-2b}{0+0-1}$

= $\frac{-2b}{-1}$

= 2b

9. If $x^y = e^{x-y}$

Taking log on both side

Log x^y = log e^{x-y}

y log x = (x – y) $\log_e$

y log x = x – y ($\log_e$ = 1)

y log x + y = x

y (log x + 1) = x

y = $\frac{x}{(\log x+1)}$

diff w.r.f (x)

$\frac{dy}{dx} = \frac{(\log x+1)\frac{d}{dx}(x)-x.\frac{d}{dx}(\log x+1)}{(\log x+1)^2}$

$= \frac{(\log x+1)1-x.\left(\frac{1}{x}+0\right)}{(\log x+1)^2}$

$= \frac{log x+1-1}{(\log x+1)^2}$

$= \frac{\log x}{(\log x+1)^2}$

10. If y = 1 + $\frac{x}{\lfloor 1} + \frac{x^2}{\lfloor 2} + \frac{x^3}{\lfloor 3} + \cdots \ldots\ldots\ldots\ldots\ldots..\infty$

Diff w.r.t ‘r’

$\frac{dy}{dx} = \frac{d}{dx}[1 + \frac{x}{\lfloor 1} + \frac{x^2}{\lfloor 2} + \frac{x^3}{\lfloor 3} + \cdots \ldots\ldots\ldots\ldots\ldots..\infty]$

= $\frac{d}{dx}(1) + \frac{d}{dx}\frac{x}{\lfloor 1} + \frac{d}{dx}\frac{x^2}{\lfloor 2} + \frac{d}{dx}\frac{x^3}{\lfloor 3} + \cdots \ldots\ldots\ldots\ldots\ldots\ldots..\infty$

$$= 0 + \frac{1}{\lfloor 1} + \frac{2x}{\lfloor 2} + \frac{3x^2}{\lfloor 3} + \cdots \ldots \ldots \ldots \ldots \ldots .. \infty$$

$$= 0 + 1 + \frac{2x}{2\lfloor 1} + \frac{3x^2}{3\lfloor 2} + \cdots \ldots \ldots \ldots \ldots . \infty$$

$$= 1 + \frac{x}{\lfloor 1} + \frac{x^2}{\lfloor 2} + \cdots \ldots \ldots \ldots \ldots \ldots \infty$$

$$\frac{dy}{dx} = y$$

DPP-NO-9C

1. If f(x) = $\log_e\left(\frac{x-1}{x+1}\right)$

Diff w.r.t 'x'

$\frac{d}{dx}f'(x) = \frac{d}{dx}\log_e\left(\frac{x-1}{x+1}\right)$

F'(x) = $\frac{1}{(x-1)} - \frac{1}{(x+1)}$

Given f'(x) = 1

1 = $\frac{x+1-x+1}{(x-1)(x+1)}$

$\frac{1}{1} = \frac{2}{x^2-1}$

$X^2 - 1 = 2$

$X^2 = 3$

X = $\pm\sqrt{3}$

2. If x = at^2 and y = 2at then $\left(\frac{dy}{dx}\right)_{t=2}$ =?

Now given x = at^2

Diff w.r.t 't'

$\frac{dx}{dt} = \frac{d}{dt}(at^2) = a\frac{d}{dt}(t^2) = a.2t = 2at$

$and\ y = 2at$

Diff w.r.t 't'

$\frac{dy}{dt} = \frac{d}{dt}(2at) = 2a\frac{d}{dt}(t) = 2a.1 = 2a$

$\frac{dy}{dx} = \frac{dy}{dt}\Big/\frac{dx}{dt} = \frac{2a}{2at} = \frac{1}{t}$

$\left(\frac{dy}{dx}\right)_{t=2} = \frac{1}{2}$

3. Given y = $\log x^x$

y = x log x

Diff w.r.t (x)

$\frac{dy}{dx} = \frac{d}{dx}(x\log x)$

$= x.\frac{d}{dx}(x\log x) + \log x.\frac{d}{dx}(x)$

= $x.\frac{1}{x} + \log x.1$

= 1 + log x

= $\log^e$ + log x

= log ex

4. $\frac{d}{dx}2^{\log 2^x} = \frac{d}{dx}[x][e^{log_e^x} = x]$

5. Given x = ct and y = $\frac{c}{t}$

$\frac{dx}{dt} = \frac{d}{dt}(t)$ $\frac{dy}{dt} = \frac{d}{dt}ct^{-1}$

= c $\frac{d}{dt}(t)$ = c.(-1) t^{-2}

= c = $\frac{-c}{t^2}$

$\frac{dy}{dx} = \frac{dy/dt}{dx/dt}$ = $\frac{-c/t^2}{c}$

$= \frac{-c}{t^2.c}$

$= -\frac{1}{t^2}$

DPP-NO-10A

1. $\int 2^{3x}.3^{2x}.5^{x}dx$

= $\int 8^{x}.9^{x}.5^{x}dx$

= $\int (8.9.5)^{x}\,dx$

= $\int (360)^{x}dx$

= $\frac{(360)^{x}}{\log 360} + c$

= $\frac{2^{3x}.3^{2x}.5^{x}}{\log 360} + c$

2. $\int a^{2x}dx = \frac{a^{2x}}{2\log a}$ $\left[\int a^{kx}dx = \frac{a^{kx}}{k\log a}\right]$

3. I = $\int_0^5 \frac{x^2}{x^2+(5-x)^2}dx$ ....(1)

I = $\int_0^5 \frac{(5+0-x)^2}{(5+0-x)^2+(5-5-0-x)^2}dx$ $\left[\int_a^b f(x)dx = \int_a^b f(a+b-x)dx\right]$

I = $\int_0^5 \frac{(5-x)^2}{(5-x)^2+x^2}dx$ ....(2)

adding (1) & (2)

2I = $\int_0^5 \frac{x^2+(5-x)^2}{x^2+(5-x)^2}dx$

= $\int_0^5 dx$

= $[x]_0^5$

2I = (5 – 0)

I = $\frac{5}{2}$

4. $\int_0^2 |1-x|\,dx = \int_0^1 |1-x|dx + \int_1^2 |1-x|dx$

= $\int_0^1 +(1-x)dx + \int_1^2 -(1-x)dx$

= + $\int_0^1 (1-x)dx - \int_1^2 (1-x)dx$

= + $\left[x - \frac{x^2}{2}\right]_0^1 - \left[x - \frac{x^2}{2}\right]_1^2$

= + $\left[\left\{1 - \frac{(1)^2}{2}\right\} - \left\{0 - \frac{0^2}{2}\right\}\right] - \left[\left\{2 - \frac{2^2}{2}\right\} - \left\{1 - \frac{1^2}{2}\right\}\right]$

= + $\left[\left(1 - \frac{1}{2}\right) - 0\right] - \left[(2-2) - \left(1 - \frac{1}{2}\right)\right]$

= + $\left[\frac{1}{2}\right] - \left[0 - 1 + \frac{1}{2}\right]$

= + $\frac{1}{2}$ + 1 - $\frac{1}{2}$

= 1

5. $\int_0^{1/2} \frac{dx}{\sqrt{3-2x}}$

$= \int_0^{1/2} (3-2x)^{-1/2}\, dx$

$= \left[\frac{(3-2x)^{\frac{-1}{2}+1}}{\left(-\frac{1}{2}+1\right)}\left(\frac{1}{-2}\right)\right]_0^{1/2}$

$= \left[\frac{(3-2x)^{1/2}}{\frac{1}{2}}\left(\frac{1}{-2}\right)\right]_0^{1/2}$

$= \left[\sqrt{3-2x}\right]_0^{1/2}$

$= -\left[\sqrt{3-2\times\frac{1}{2}} - \sqrt{3-2\times 0}\right]$

$= -\left[\sqrt{2}-\sqrt{3}\right]$

$= \left(\sqrt{3}-\sqrt{2}\right)$

6. $\int_0^2 x\, e^{x^2}\, dx$

$= \int_0^2 e^{x^2} \times x\, dx$

Let $x^2 = t$

$2x\, dx = dt$

$X\, dx = \frac{dt}{2}$

$= \int_0^4 e^t \times \frac{dt}{2}$ ($t = x^2 = 2^2 = 4$)

$= \frac{1}{2}\int_0^4 e^t\, dt$

$= \frac{1}{2}[e^t]_0^4 = \frac{1}{2}[e^4 - e^0] = \frac{1}{2}[e^4 - 1]$

7. $\int_1^2 \left(\frac{1-x}{1+x}\right) dx$

$= -\int_1^2 \left(\frac{x-1}{x+1}\right) dx$

$= -\int_1^2 \left(\frac{x+1-2}{x+1}\right) dx$

$= -\int_1^2 \left[\left(\frac{x-1}{x+1}\right) - \frac{2}{x+1}\right] dx$

$= -\int_1^2 1\, dx + \int_1^2 \frac{2}{x+1}\, dx$

$= -[x]_1^2 + [2\log(x+1)]_1^2$

$= -(2-1) + 2\,[\log(2+1) - \log(1+1)]$

$= -1 + 2(\log 3 - \log 2)$

$= -1 + 2\log\left(\frac{3}{2}\right)$

$= \; 2\log\left(\frac{3}{2}\right) - 1$

8. $\int_0^2 \frac{3^{\sqrt{x}}}{\sqrt{x}} dx$

$let \sqrt{x} = t$

$\frac{1}{2\sqrt{x}} dx = dt$

$\frac{1}{\sqrt{x}} dx = 2dt$

$= \; \int_0^{\sqrt{2}} 3^t . 2\, dt$

$= 2\int_0^{\sqrt{2}} 3^t\, dt$

$= 2\left[\frac{3^t}{log_e^3}\right]_0^{\sqrt{2}}$

$= \; \frac{2}{log_e^3}[3^t]_0^{\sqrt{2}} = \frac{2}{log_e^3}\left[3^{\sqrt{2}} - 3^0\right]$

$= \frac{2}{log_e^3}\left[3^{\sqrt{2}} - 1\right]$

9. $\int \frac{x}{(x^2+1)(x^2+2)}$dx

Let $x^2 = t$

2x dx = dt

X dx = $\frac{dt}{2}$

=$\int \frac{1}{(t+1)(t+2)} \frac{dt}{2}$

= $\frac{1}{2}\int \frac{1}{(t+1)(t+2)} dt$

= $\frac{1}{2}\int \left[\frac{1}{(t+1)} - \frac{1}{(t+2)}\right]^{dt}$

= $\frac{1}{2}\left[\int \frac{1}{(t+1)} dt - \int \frac{1}{(t+2)} dt\right]$

= $\frac{1}{2}[\log(t+1) - \log(t+2)] + c$

= $\frac{1}{2}\left[\log\frac{(t+1)}{(t+2)}\right] + c$

= $\frac{1}{2}\left[\log\left(\frac{x^2+1}{x^2+2}\right)\right] + c$

10. $\int_1^2 \frac{x}{x^2+1} dx$ = $\frac{1}{2}\int_1^2 \frac{2x}{(x^2+1)} dx$

= $\frac{1}{2}[\log(x^2+1)]_1^2$

= $\frac{1}{2}$[log (2^2 + 1) – log (1^2 + 1)]

= $\frac{1}{2}$ [log 5 – log 2]

= $\frac{1}{2}\log\left(\frac{5}{2}\right)$

DPP-NO-10B

1. $\int e^x[f(x)+f^1(x)]dx$
   $= \int e^x f(x)dx + \int e^x f^1(x)dx$
   $= \int f(x).e^x\,dx + \int e^x f^1(x)dx$
   $= f(x)\int e^x dx - \int\left(\frac{d}{dx}f(x)\int e^x dx\right)dx + \int e^x.f^1(x)dx$
   $= f(x).e^x - \int f^1(x).e^x dx + \int e^x.f^1(x)dx$
   = e^x.f(x) + c

2. I = $\int xe^{x2}\,dx$
   let x^2 = t
   2x dx = dt
   X dx = $\frac{dt}{2}$
   I = $\int e^t\frac{dt}{2}$
   I = $\frac{1}{2}\int e^{tdt}$
   = $\frac{1}{2}$ e^t +c
   = $\frac{1}{2}$ex^2 + c

3. $\int_1^2\left(\frac{1-x}{1+x}\right)dx$
   $= \int_1^2\left(\frac{1}{1+x}-\frac{x}{1+x}\right)dx$
   $= \int_1^2\frac{1}{1+x}dx - \int_1^2\frac{x}{1+x}dx$
   $= \int_1^2\frac{1}{1+x}dx - \int_1^2\left(\frac{1+x-1}{1+x}\right)dx$
   $= \int_1^2\frac{1}{(1+x)}dx - \int_1^2\left(1-\frac{1}{1+x}\right)dx$
   $= \int_1^2\frac{1}{1+x}dx - \int_1^2 1\times dx + \int_1^2\frac{1}{1+x}dx$
   $= 2\int_1^2\frac{1}{1+x}dx - \int_1^2 1\,dx$
   $= 2[\log(1+x)]_1^2 - [x]_1^2$
   = 2 [log(2 + 1) – log (1 + 1)] – [2 – 1]
   = 2 [log 3 – log 2] – 1
   = 2 log$\frac{3}{2}$ – 1

4. $\int_0^2 \frac{3^{\sqrt{x}}}{\sqrt{x}} dx$

$let\ \sqrt{x}$ = t

$= \int_1^2 3^{\sqrt{x}} \frac{1}{\sqrt{x}} dx \ \frac{1}{2\sqrt{x}} dx = dt$

$\frac{1}{\sqrt{x}} dx = 2\ dt$

x	0	2
t	2	$\sqrt{2}$

= $\int_0^{\sqrt{2}} 3^t . 2dt$

= 2 $\int_0^{\sqrt{2}} 3^t dt$

= 2$\left[\frac{3^t}{\log 3}\right]_0^{\sqrt{2}}$

= 2 $\left[\frac{3^{\sqrt{2}}}{\log 3} - \frac{3^0}{\log 3}\right]$

= 2 $\left[\frac{3^{\sqrt{2}} - 3^0}{\log 3}\right]$

= $\frac{2(3^{\sqrt{2}} - 1)}{\log_e 3}$

5. I = $\int_0^2 \frac{\sqrt{x}}{\sqrt{x} + \sqrt{2-x}} dx$ ....(1)

I = $\int_0^2 \frac{\sqrt{0+2-x}}{\sqrt{0+2-x} + \sqrt{2-(0+2-x)}} dx$ $\left[\int_a^b f(x)dx = \int_a^b f(a+b-x)dx\right]$

I = $\int_0^2 \frac{\sqrt{2-x}}{\sqrt{2-x} + \sqrt{x}} dx$ ....(2)

addly (1) and (2) we get

2I = $\int_0^2 \left(\frac{\sqrt{x}}{\sqrt{x + \sqrt{2-x}}} + \frac{\sqrt{2-x}}{\sqrt{2-x\sqrt{x}}}\right) dx$

2I = $\int_0^2 \frac{(\sqrt{x} + \sqrt{2-x})}{(\sqrt{x} + \sqrt{2-x})} dx$

2I = $\int_0^2 1 dx$

2I = $[x]_0^2$

2I = [2 – 0]

2I = 2

I = 1

6. $\int_{-1}^{1}(e^{x}-e^{-x})dx$

Because, given function (e^x – e^{-x}) is a ODD function

Say, f(x) = e^x – e^{-x}

Then f(-x) = - (e^x – e^{-x}) = - f(x)

So, the given function id "ODD"

7. Given : f(x) = $3x^2$ - $\frac{2}{x^3}$) dx

We know, f(x) = $\int f(x)dx = \int(3x^2 - \frac{2}{x^3})$dx

F(x) = $x^3 + x^{-2} + c$ ………….(i)

Given f(1) = 0

F(1) = $(1)^3 + (1)^{-2} + c$

0 = 1 + 1 + c

C = -2

By (1)

F(x) = $x^3 + x^{-2}$ -2

8. $\int_{-1}^{1}\frac{|x|}{x}dx$

$f(x) = \frac{|x|}{x}$

$f(-x) = \frac{|-x|}{-x} = \frac{|x|}{x} = \frac{-|x|}{x}$

$f(-x)$ = - f(x)

$so\ it\ is\ odd\ function$

$\int_{-1}^{1}\frac{|x|}{x}dx$= 0