RBSE Class 12th Maths Question Paper With Solution 2017

QUESTION PAPER CODE 816

SECTION - A

Question 1: Find the value of $\sin [\pi / 3 + \sin^{-1} (- 1 / 2)]$.

Solution:

$\sin [\pi / 3 + \sin^{-1} (- 1 / 2)]$

$= \sin [\pi / 3 - \sin^{-1} (1 / 2)]$

$= \sin ([\pi / 3] - [\pi / 6])$

$= \sin (\pi / 6)$

$= 1 / 2$

Question 2: If $A = \begin{bmatrix} 2 & 4 \\ -3 & 2 \end{bmatrix}, B = \begin{bmatrix} 1 & 3 \\ -2 & 5 \end{bmatrix}$**, then find 2A - B.**

Solution:

$$A = \begin{bmatrix} 2 & 4 \\ -3 & 2 \end{bmatrix} B = \begin{bmatrix} 1 & 3 \\ -2 & 5 \end{bmatrix}$$

$$2A - B = 2\begin{bmatrix} 2 & 4 \\ -3 & 2 \end{bmatrix} - \begin{bmatrix} 1 & 3 \\ -2 & 5 \end{bmatrix}$$

$$= \begin{bmatrix} 4 & 8 \\ -6 & 4 \end{bmatrix} - \begin{bmatrix} 1 & 3 \\ -2 & 5 \end{bmatrix}$$

$$= \begin{bmatrix} 4-1 & 8-3 \\ -6+2 & 4-5 \end{bmatrix}$$

$$= \begin{bmatrix} 3 & 5 \\ -4 & -1 \end{bmatrix}$$

Question 3: If A = [2 - 4 3] and B = $\begin{bmatrix} 2 \\ -4 \\ 8 \end{bmatrix}$, then find (AB)'.

Solution:

A = [2 - 4 3] and B = $\begin{bmatrix} 2 \\ -4 \\ 8 \end{bmatrix}$

AB = [4 + 16 + 24]

= [44]

(AB)' = 44

Question 4: Find: $\int(\sqrt{x} + (1 / \sqrt{x})^2\, dx$.

Solution:

$\int(\sqrt{x} + (1 / \sqrt{x})^2\, dx$

$= \int(x + (1 / x) + 2)\, dx$

$= (x^2 / 2) + \log x + 2x + c$

Question 5: Find the general solution of the differential equation: $(dy / dx) = 2x / y^2$.

Solution:

$(dy / dx) = 2x / y^2$

$\int y^2\, dy = \int 2x\, dx$

$(y^3 / 3) = x^2 + c$

Question 6: If vector a = 2i - 2j + 2k and vector b = i + j - k, then find the unit vector along the vector (a + b).

Solution:

a = 2i - 2j + 2k

b = i + j - k

a + b = 2i - 2j + 2k + i + j - k

= 3i - j + k

The unit vector along the vector (a + b) is given by

n = n / |n|

$= (3i - j + k) / \sqrt{3^2 + (-1)^2 + 1^2}$

$= (3i - j + k) / \sqrt{11}$

Question 7: Find the cartesian form of the equation of the line passing through the points (1, 0, 2) and (4, 5, 6).

Solution:

The cartesian form of the equation passing through two points (x_1, y_1, z_1) and (x_2, y_2, z_2) is given by

$(x - x_1) / (x_2 - x_1) = (y - y_1) / (y_2 - y_1) = (z - z_1) / (z_2 - z_1)$

(x - 1) / (4 - 1) = (y - 0) / (5 - 0) = (z - 2) / (6 - 2)

(x - 1) / 3 = y / 5 = (z - 2) / 4

Question 8: If a line makes 120°, 45° and 90° angles with the x, y and z-axis respectively then find its direction-cosines.

Solution:

If a line makes α, β, γ with the x, y and z-axis respectively, then the direction cosines are given by

l = cos α

m = cos β

n = cos γ

$l = \cos 120^o = -1 / 2$

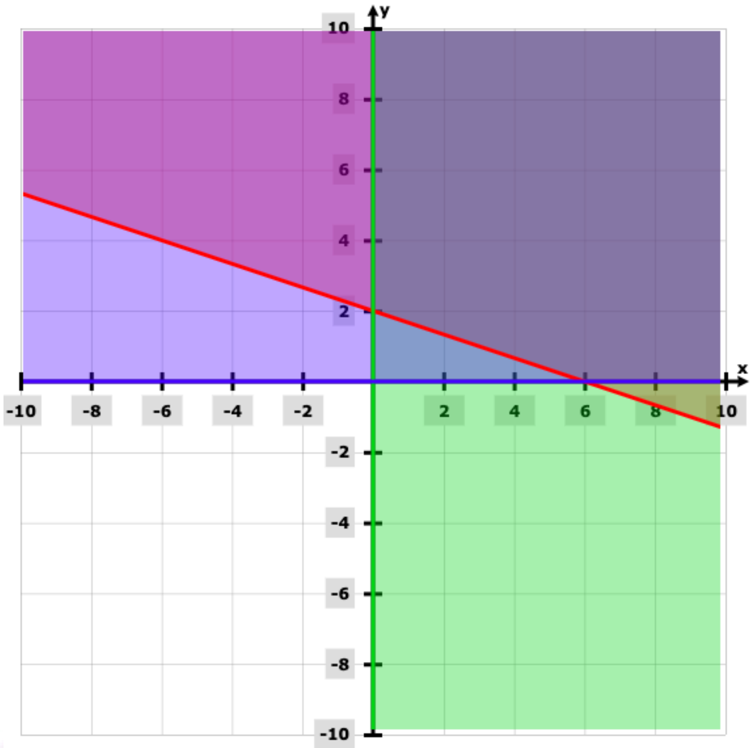
$m = \cos 45^o = 1 / \sqrt{2}$

$n = \cos 90^o = 0$

It is conceptually a wrong question because $l^2 + m^2 + n^2 = 1$.

Question 9: Show the region of the feasible solution under the following constraints: x + 3y ≥ 6, x ≥ 0, y ≥ 0 in the answer book.

Solution:



Question 10: If P (B / A) = 0.2, P (A) = 0.8, then find P (A ∩ B).

Solution:

P (B / A) = 0.2

P (A) = 0.8

P (B / A) = P (A ∩ B) / P (A)

0.2 = P (A ∩ B) / 0.8

0.2 * 0.8 = P (A ∩ B)

P (A ∩ B) = 0.16

SECTION - B

Question 11: [a] Prove that the relation R defined on the set Z as aRb ⇔ a – b is divisible by 3 is an equivalence relation.

OR

[b] If function f, g: R → R, are defined as f (x) = x^2, g (x) = 2x then find

[i] f o g (x)

[ii] g o f (x)

[iii] f o f (3)

Solution:

[a] aRb ⇔ a – b is divisible by 3

(i) Reflexive : aRa ⇒ a – a = 0 is divisible by 3

∴ R is reflexive.

(ii) Symmetric: Let (a, b) ∈ R

⇒ aRb ⇔ a – b is divisible by 3

⇒ bRa ⇔ b – a is divisible by 3

⇒ (b, a) ∈ R

∴ R is symmetric

(iii) Transitive: Again (a, b) ∈ R and (b, c) ∈ R

aRb ⇔ a – b is divisible by 3 and bRc ⇔ b – c is divisible by 3

⇒ a – b is divisible by 3 and b – c is divisible by 3

⇒ (a – b) + (b – c) is divisible by 3

⇒ a – c is divisible by 3

⇒ (a, c) ∈ R

∴ R is transitive, hence R is an equivalence relation.

OR

[b] f (x) = x^2, g (x) = 2x

(i) f o g (x) = f [g (x)] = f (2x) = $(2x)^2 = 4x^2$
(ii) g o f (x) = g [f (x)] = g $(x^2) = 2x^2$
(iii) f o f (x) = f [f (x)] = f $(x^2) = (x^2)^2 = x^4$
∴ f o f (3) = $(3)^4 = 81$

Question 12: [a] Express the function $\tan^{-1}$ [(cosx - sinx) / (cosx + sinx)]; π / 4 < x < 3π / 4 in the simplest form.

OR

[b] Prove that $\sin^{-1}$ (8 / 17) + $\sin^{-1}$ (3 / 5) = $\tan^{-1}$ (77 / 36).

Solution:

[a] $\tan^{-1}$ [(cosx - sinx) / (cosx + sinx)]
= $\tan^{-1}$ [(1 - {sinx / cosx}) / (1 + {sinx / cosx})]
= $\tan^{-1}$ [(1 - tanx) / (1 + tanx)]
= $\tan^{-1}$ [(tan π / 4 - tan x) / [1 + tan (π / 4) tan x]]
= $\tan^{-1}$ (tan (π / 4 - x)
= π / 4 - x

OR

[b] $\sin^{-1}$ (8 / 17) + $\sin^{-1}$ (3 / 5)
= $\sin^{-1}$ [(8 / 17) √1 − (3 / 5)^2 + (3 / 5) √(1 − (8 / 17)^2]
= $\sin^{-1}$ [(8 / 17) (4 / 5) + (3 / 5) (15 / 17)]
= $\sin^{-1}$ [(32 / 85) + (45 / 85)]
= $\sin^{-1}$ [77 / 85]
= $\tan^{-1}$ [(77 / 85) / √1 − (77 / 85)^2]
= $\tan^{-1}$ (77 / 36)

Question 13: If A = $\begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$, then prove that $A^2 - 5A + 7I_2 = 0$, where I_2 is the identity matrix of order 2.

Solution:

$$A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$$
$$A^2 = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix} \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix} = \begin{bmatrix} 9-1 & 3+2 \\ -3-2 & -1+4 \end{bmatrix} = \begin{bmatrix} 8 & 5 \\ -5 & 3 \end{bmatrix}$$
$$A^2 - 5A + 7I_2 = \begin{bmatrix} 8 & 5 \\ -5 & 3 \end{bmatrix} - 5\begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix} + 7\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$
$$= \begin{bmatrix} 8 & 5 \\ -5 & 3 \end{bmatrix} - \begin{bmatrix} 15 & 5 \\ -5 & 10 \end{bmatrix} + \begin{bmatrix} 7 & 0 \\ 0 & 7 \end{bmatrix}$$
$$= \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$$

Question 14: Examine the continuity of function f (x) = $\begin{cases} x+5 & x \le 1 \\ x-5 & x > 1 \end{cases}$ at point x = 1.

Solution:

f (x) = $\begin{cases} x+5 & x \le 1 \\ x-5 & x > 1 \end{cases}$

Left hand limit = $\lim_{x \to 1^-} (x + 5) = 6$

Right hand limit = $\lim_{x \to 1^-} (x - 5) = -4$

Since LHL ≠ RHL, f (x) is discontinuous at x = 1.

Question 15: [a] Find the equation of the tangent to the curve $y = x^3 - x + 1$ at the point whose x coordinate is 1.

OR

[b] The length x of a rectangle is decreasing at the rate 3 cm/minute and the width y is increasing at the rate 5cm / minute. When x = 10 cm and y = 6 cm, find the area of the rectangle.

Solution:

[a] $y = x^3 - x + 1$ ….(i)

$dy / dx = 3x^2 - 1$

At x = 1 ⇒ dy / dx = 2

At x = 1 from the equation of curve y = 1

∴ The equation of tangent at (1, 1) is

$y - 1 = (dy / dx)_{(1,1)} (x - 1)$

$\Rightarrow y - 1 = 2 (x - 1)$

$\Rightarrow 2x - y - 1 = 0$

OR

[b] Let at any instant of time t, length be x, breadth y and the area A, then given that dt

$dx / dt = -3$ cm / min

$dy / dt = 5$ cm / min

Area $A = xy$

On differentiating with respect to t,

$dA / dt = x (dy / dt) + y (dx / dt)$

$= 10 (5) + 6 (-3)$

$dA / dt = 32$ cm^2 /min

Question 16: Find the maximum profit that a company can make, if the profit function is given by $P (x) = 51 - 72x - 18x^2$.

Solution:

$P (x) = 51 - 72x - 18x^2$

$P' (x) = - 72 - 36x$

Equate P'(x) to 0 and solve for x.

$P' (x) = 0$

$- 72 - 36x = 0$

$x = -2$

Since, P' (x) < 0 at x = −2, P (x) is maximum at x = −2 which is given by

$P (-2) = 51 - 72 * (-2) - 18 * (-2)^2$

$= 51 + 144 - 72$

$= 123$

Question 17: [a] Find: $\int (dx / x (x^5 + 1))$.

OR

[b] Find: $\int (x \sin^{-1} x / \sqrt{1 - x^2})\, dx$.

Solution:

[a] $\int (dx / x (x^5 + 1))$

$I = \int (dx / x (x^5 + 1))$

$= \int (x^4\, dx / x^5 (x^5 + 1))$

Put $x^5 + 1 = t$

$5x^4\, dx = dt$

$x^4\, dx = dt / 5$

$\int (x^4\, dx / x^5 (x^5 + 1)) = (1 / 5) \int dt / t (t - 1)$

$= (1 / 5) \int [(1 / t - 1) - (1 / t)]\, dt$

$= (1 / 5) \log |t - 1| - \log t + c$

$= (1 / 5) \log |(t - 1) / (t)| + c$

$= (1 / 5) \log (x^5 / x^5 + 1) + c$

OR

[b] $I = \int (x \sin^{-1} x / \sqrt{1 - x^2})\, dx$

Put $t = \sin^{-1} x$

$dt = 1 / \sqrt{1 - x^2}\, dx$

$\int (x \sin^{-1} x / \sqrt{1 - x^2})\, dx = \int t \sin t\, dt$

$= t \int \sin t\, dt - \int [(dt / dt) \int \sin t\, dt]\, dt$

$= - t \cos t + \sin t + c$

$= x - \sin^{-1} x \sqrt{1 - x^2} + c$

Question 18: Find: $\int \sec^2 x\, dx / \sqrt{\tan^2 x + 4}$.

Solution:

$I = \int \sec^2 x\, dx / \sqrt{\tan^2 x + 4}$

Put $t = \tan x$

$dt = \sec^2 x\, dx$

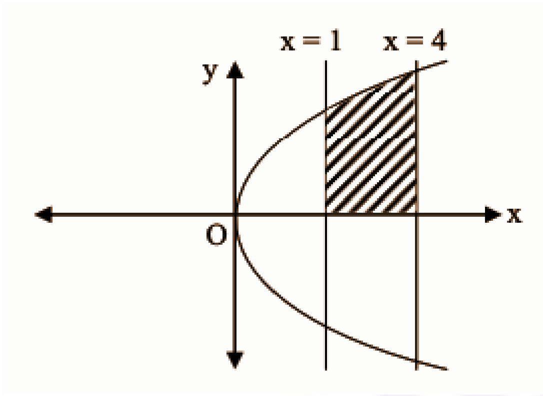
$\int \sec^2 x\, dx / \sqrt{\tan^2 x + 4} = \int dt / \sqrt{t^2 + 4}$

$= \log |t + \sqrt{t^2 + 4}| + c$

$= \log |\tan x + \sqrt{\tan^2 x + 4}| + c$

Question 19: Find the area of the region bounded by parabola $y^2 = 16x$ and the lines x = 1, x = 4 and x-axis in the first quadrant.

Solution:



$A = \int_1^4 y\, dx$

$= \int_1^4 4\sqrt{x}\, dx$

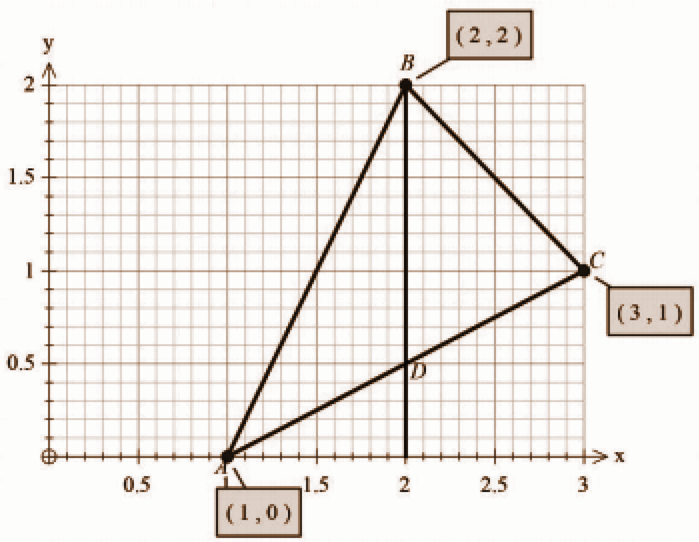
$= 4 (x^{3/2} / (3 / 2))_1^4$

$= (8 / 3) (8 - 1)$

= 56 / 3 square units

Question 20: Using integration, find the area of the region bounded by the triangle ABC whose vertices are A (1, 0), B (2, 2) and C (3, 1).

Solution:



Equation of AB

⇒ $y - 2 = (2 - 0 / 2 - 1)(x - 2)$

⇒ $y - 2 = 2x - 4$

⇒ $2x = y + 2$

⇒ $x = (1 / 2)(y + 2)$

Equation of AC

⇒ $y - 0 = (1 - 0 / 3 - 1)(x - 1)$

⇒ $2y = x - 1$

⇒ $x = 2y + 1$

Equation of BC

⇒ $y - 2 = (2 - 1 / 2 - 3)(x - 2)$

⇒ $y - 2 = -x + 2$

⇒ $x = 4 - y$

Required area = Area of ABD + Area of DBCE – Area of ACE

$= \int_1^2 (2x - 2)\,dx + \int_2^3 (4 - x)\,dx + \int_1^3 (x - 1) / 2\,dx$

$= (x^2 - 2x)_1^2 + (4x - (x^2 / 2))_2^3 - (1 / 2)((x^2 / 2) - x)_1^3$

$= |(4 - 4) - (1 - 2)| + |(12 - (9 / 2)) - (8 - 2)| - (1 / 2)\,|((9 / 2) - 3) - ((1 / 2) - 1)|$

$= 1 + (3 / 2) - (1 / 2)(2)$

$= 3 / 2$

Question 21: If a = 5i - j - 3k and b = i - 3j - 5k, then find the angle between the vectors (a + b) and (a - b).

Solution:

a + b = 6i + 2j - 8k

a - b = 4i - 4j + 2k

Angle between a + b and a - b is given by

cos θ = (a + b) (a - b) / |a + b| |a - b|

$(24 - 8 - 16) / \sqrt{104}\sqrt{36} = 0$

$\theta = 90^o$

Question 22: Find the area of a parallelogram whose adjacent sides are vectors a = i - j + 3k and b = 2i - 7j + k.

Solution:

a = i - j + 3k

b = 2i - 7j + k

A = |a x b|

$$(a \times b) = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 1 & -1 & 3 \\ 2 & -7 & 1 \end{vmatrix}$$

= i (–1 + 21) – j (1 – 6) + k (–7 + 2)

= 20i + 5j - 5k

$A = |a \times b| = \sqrt{400 + 25 + 25} = \sqrt{450}$

Question 23: By graphical method solve the following linear programming problem for minimize.

Objective function Z = 5x + 7y

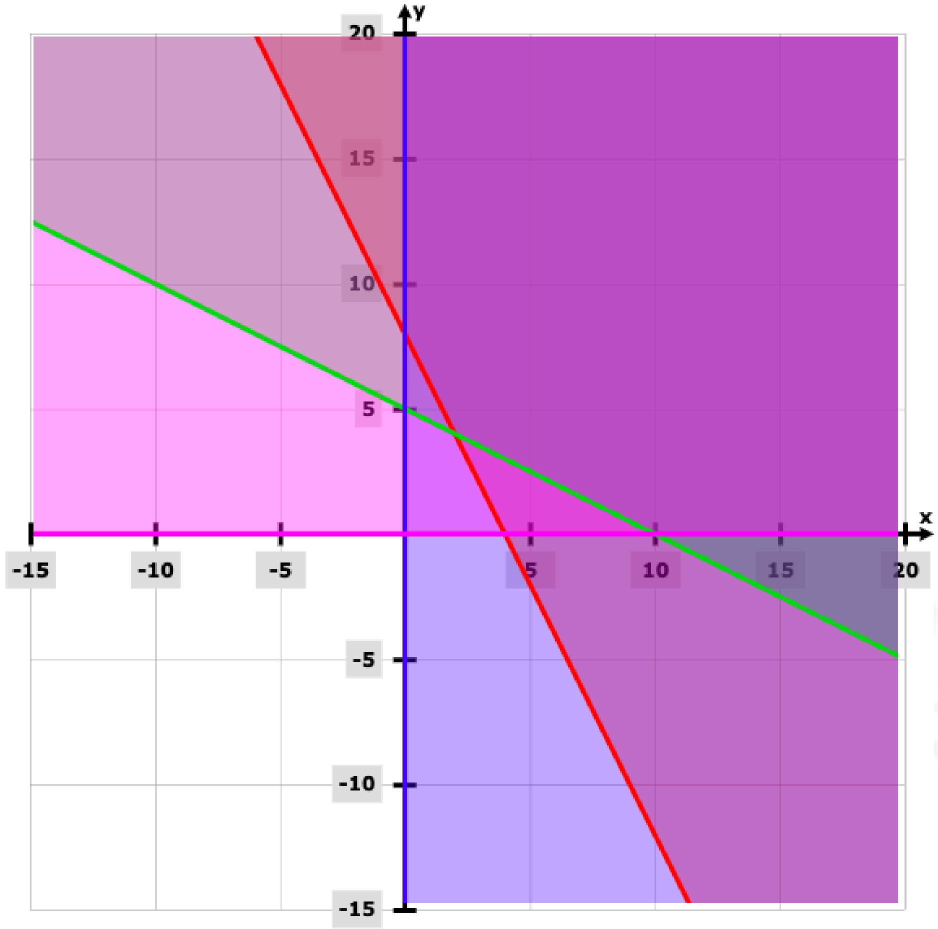
Constraints

$2x + y \geq 8$

$x + 2y \geq 10$

$x \geq 0, y \geq 0$

Solution:



Points	Z
(10, 0)	50
(0, 8)	56
(2, 4)	38

The minimum value of Z is 38 at the point (2, 4).

Question 24: Given three identical boxes I, II and III each containing two coins. In the box I both coins are gold coins in box II both are silver coins and in the box III, there is one gold and one silver coin. A person chooses a box at random and takes out a coin. If the coin is of silver what is the probability that the other coin in the box is also of silver.

Solution:
Let E_1, E_2 and E_3 be three boxes.
$P(E_1) = P(E_2) = P(E_3) = 1 / 3$
A → A coin of silver being drawn
$P(A / E_1) = 0 / 2 = 0$
$P(A / E_2) = 1$
$P(A / E_3) = 1 / 2$
$P(E_2 / A) = [P(E_2) * P(A / E_2)] / [P(E_1) * P(A / E_1) + P(E_2) * P(A / E_2) + P(E_3) * P(A / E_3)]$
= [(1 / 3) * 1] / [(1 / 3) * 0 + (1 / 3) * 1 + (1 / 3 * 1 / 2)]
= 1 / (3 / 2)
= 2 / 3

Question 25: Find the variance of the number obtained on a throw of an unbiased die.

Solution:
Sample space S = {1, 2, 3, 4, 5, 6}
Probability distribution table

x	1	2	3	4	5	6
P (x)	1 / 6	1 / 6	1 / 6	1 / 6	1 / 6	1 / 6

P (1) = P (2) = P (3) = P (4) = P (5) = P (6) = 1 / 6
$E(x) = \sum x * P(x)$
= (1 * (1 / 6)) + (2 * (1 / 6)) + (3 * (1 / 6)) + (4 * (1 / 6) + (5 * (1 / 6) + (6 * (1 / 6))
= 21 / 6

$E(x^2) = 1^2 (1 / 6) + 2^2 (1 / 6) + 3^2 (1 / 6) + 4^2 (1 / 6) + 5^2 (1 / 6)$
= 91 / 6

$Var(x) = E(x^2) + (E(x))^2$
$= (91 / 6) - (21 / 6)^2$

= 35 / 12

SECTION - C

Question 26: Show that $\begin{vmatrix} a & a^2 & 1+pa^3 \\ b & b^2 & 1+pb^3 \\ c & c^2 & 1+pc^3 \end{vmatrix}$ **= (1 + pabc) (a - b) (b - c) (c - a).**

Solution:

$$\begin{vmatrix} a & a^2 & pa^3 \\ b & b^2 & pb^3 \\ c & c^2 & pc^3 \end{vmatrix} + \begin{vmatrix} a & a^2 & 1 \\ b & b^2 & 1 \\ c & c^2 & 1 \end{vmatrix}$$

$$= \begin{vmatrix} a & a^2 & 1 \\ b & b^2 & 1 \\ c & c^2 & 1 \end{vmatrix} + abcp \begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix}$$

$$= (1 + pabc) \begin{vmatrix} a & a^2 & 1 \\ b & b^2 & 1 \\ c & c^2 & 1 \end{vmatrix}$$

$$R_1 \to R_1 - R_2, R_2 \to R_2 - R_3$$

$$= (1 + abcp) \begin{vmatrix} a-b & a^2-b^2 & 0 \\ b-c & b^2-c^2 & 1 \\ c & c^2 & 1 \end{vmatrix}$$

= (1 + abcp) [(a – b) $(b^2 – c^2)$ – (b – c) $(a^2 – b^2)$]

= (1 + abcp) (a – b) (b – c) {(b + c) – (a + b)}

= (a – b) (b – c) (c – a) (1 + abcp)

Question 27: If y = $x^x + x^p + p^x + p^p$, p > 0 and x > 0, find dy / dx.

Solution:

y = $x^x + x^p + p^x + p^p$

Cosnider z = x^x

log z = x log x

(1 / z) (dz / dx) = log x + 1

dz / dx = x^x (1 + log x)

$dy / dx = x^x (1 + \log x) + px^{p-1} + p^x \log p$

Question 28: Show that $\int_0^\pi [x\, dx / (a^2 \cos^2 x + b^2 \sin^2 x)] = \pi^2 / 2ab$.

Solution:

$I = \int_0^\pi [x\, dx / (a^2 \cos^2 x + b^2 \sin^2 x)]$ ---- (1)

$I = \int_0^\pi (\pi - x)\, dx / (a^2 \cos^2 x + b^2 \sin^2 x)$ ---- (2)

Adding (1) and (2)

$2I = \int_0^\pi (\pi)\, dx / (a^2 \cos^2 x + b^2 \sin^2 x)$

$2I = 2\pi \int_0^{\pi/2} dx / (a^2 \cos^2 x + b^2 \sin^2 x)$

$I = \pi \int_0^{\pi/2} \sec^2 x\, dx / a^2 + b^2 \tan^2 x$

Let $\tan x = t$

$\sec^2 x\, dx = dt$

$I = \pi \int_0^\infty dt / a^2 + b^2t^2$

$I = \pi / b^2 \int_0^\infty dt / [(a^2 / b^2) + t^2]$

$I = (\pi / b^2) * (1 / (a / b)) [\tan^{-1} t / (a / b)]_0^\infty$

$I = (\pi / ab) * [(\pi / 2) - 0]$

$I = \pi^2 / 2ab$

Question 29: [a] Find the solution of the differential equation $(x - y)\, dy - (x + y)\, dx = 0$.

OR

[b] Find the solution of the differential equation $\cos^2 x * (dy / dx) + y = \tan x$ $[0 \leq x \leq \pi / 2]$

Solution:

[a] $(x - y)\, dy - (x + y)\, dx = 0$

$dy / dx = (x + y) / (x - y)$

Let $y = vx$

$dy / dx = v + x (dv / dx)$

$v + x (dv / dx) = (x + vx) / (x - vx)$

$x (dv / dx) = (1 + v) / (1 - v) - v$

$x (dv / dx) = (1 + v - v + v^2) / (1 - v)$

$\int (1 - v) / (1 + v^2)\, dv = \int dx / x$

$\int 1 / (1 + v^2)\, dv - \int v / (1 + v^2)\, dv = \int dx / x$

$\tan^{-1} v - (1 / 2) \log (1 + v^2) = \log x + c$

$\tan^{-1} (y / x) - (1 / 2) \log (1 + [y^2 / x^2]) = \log x + c$

$\tan^{-1} (y / x) - (1 / 2) \log [y^2 + x^2] = c$

OR

[b] $\cos^2 x * (dy / dx) + y = \tan x$

$dy / dx + y / \cos^2 x = \tan x / \cos^2 x$ which is linear equation in 'y'

Here, $P = 1 / \cos^2 x = \sec^2 x$; $Q = \sec^2 x . \tan x$

$IF = e^{\int P\, dx} = e^{\tan x}$

$y e^{\tan x} = \int e^{\tan x} \tan x \ \sec^2 x\, dx + c$

Put tanx = z in R.H.S.

$\sec^2 x\, dx = dz$

$\int e^{\tan x} \tan x \ \sec^2 x\, dx + c$

$= \int e^z z\, dz$

$= z e^z - \int 1\, e^z\, dz$

$= z e^z - e^z$

$= (z - 1) e^z$

$= (\tan x - 1)\, e^{\tan x}$

$y e^{\tan x} = (\tan x - 1)\, e^{\tan x} + c$

$y = (\tan x - 1) + c e^{-\tan x}$

Question 30: [a] Find the shortest distance between the lines r = (i - 2j + 3k) + ƛ (- i + j - 2k) and r = (i - j - k) + µ (i + 2j - 2k).

OR

[b] Find the equation of the plane that contains the point (2, -1, 3) and is perpendicular to each of the planes 2x + 3y - 2z = 5 and x + 2y - 3z = 8.

Solution:

[a] $a_1 = i - 2j + 3k$

$a_2 = i - j - k$

$b_1 = (- i + j - 2k)$

$b_2 = (i + 2j - 2k)$

Shortest distance = $|(a_2 - a_1)(b_1 * b_2) / |(b_1 * b_2)|$

$(b_1 * b_2) = i(-2 + 4) - j(2 + 2) + k(-2 - 1)$

$= 2i - 4j - 3k$

$(a_2 - a_1) = j - 4k$

$SD = |(-4 + 12) / \sqrt{4 + 16 + 9}| = 8 / \sqrt{29}$

OR

[b] Let the equation of plane

$a(x - 2) + b(y + 1) + c(z - 3) = 0$ ....(1)

The plane (1) is perpendicular to the planes $2x + 3y - 2z = 5$ and $x + 2y - 3z = 8$

$\therefore 2a + 3b - 2c = 0 \cdots (2)$

$a + 2b - 3c = 0 \ldots (3)$

Solving (2) & (3)

From (1)

$-5(x - 2) + 4(y + 1) + (z - 3) = 0$

$-5x + 4y + z + 11 = 0$

$5x - 4y - z - 11 = 0$