CREATIVE EDUCATION FOUNDATION, KARKALA
SECOND PU ANNUAL EXAMINATION MARCH – 2025
BASIC MATHEMATICS DETAILED SOLUTION

PART – A

I. Answer all the multiple-choice questions: $(10 \times 1 = 10)$

1. If $A = \begin{bmatrix} 3 & 2 \\ 2 & 4 \end{bmatrix}$ $then\ 2A'$ is

   A) $\begin{bmatrix} 6 & 1 \\ 4 & 2 \end{bmatrix}$ B) $\begin{bmatrix} 6 & 2 \\ 4 & 8 \end{bmatrix}$ C) $\begin{bmatrix} 6 & 2 \\ 8 & 4 \end{bmatrix}$ D) $\begin{bmatrix} 6 & 4 \\ 4 & 8 \end{bmatrix}$

   Ans: (D) $\begin{bmatrix} 6 & 4 \\ 4 & 8 \end{bmatrix}$

2. If ${}^nC_{10} = {}^nC_5$ then value of 'n' is

   A) 15 B) 25 C) 5 D) 10

   Ans: (A) 15

3. Two coins are tossed simultaneously. The probability of getting exactly two heads is

   A) $\frac{1}{2}$ B) $\frac{3}{4}$ C) $\frac{1}{4}$ D) 1

   Ans: (C) $\frac{1}{4}$

4. The converse of $\sim p \rightarrow \sim q$ is

   A) $\sim p \rightarrow q$ B) $q \rightarrow p$ C) $p \rightarrow q$ D) $\sim q \rightarrow \sim p$

   Ans: D) $\sim q \rightarrow \sim p$

5. The Compound ratio of $3:4$ and $4:7$ is

   A) $3:12$ B) $3:7$ C) $7:3$ D) 12:7

   Ans: (B) $3:7$

6. If $\sin A = \frac{1}{2}$ then value of $sin2A$ is

   A) $\frac{\sqrt{3}}{2}$ B) $\frac{1}{2}$ C) 0 D) 1

   Ans: (A) $\frac{\sqrt{3}}{2}$

7. The equation of the directrix of the parabola $x^2 = 8y$ is

   A) $y = 2$ B) $x = 2$ C) $x = -2$ D) $y = -2$

   Ans: (D) $y = -2$

8. If $y = 5e^x - logx$ $then$ $\frac{dy}{dx}$ is

   A) $e^{5x} - \frac{1}{x}$ B) $5e^x - \frac{1}{x}$ C) $5e^x - x$ D) $5x - \frac{1}{x}$

   Ans: (B) $5e^x - 1/x$

9. $\int \frac{1}{7x+8} dx$ is

A) $\log(7x+8)+C$ B) $\frac{\log(7x+8)}{7}+C$

C) $7\log(7x+8)+C$ D) $\frac{1}{\log(7x+8)}+C$

Ans: (B) $\frac{\log(7x+8)}{7}+C$

10. $\int x^5 dx$ is

A) $5x^4+C$ B) $\frac{x^5}{5}+C$ C) $\frac{X^4}{4}+C$ D) $\frac{x^6}{6}+C$

Ans: (D) $\frac{x^6}{6}+C$

II. Match the following: $(\mathbf{5 \times 1 = 5})$

11.

A	B
A) If $\begin{vmatrix} 3 & x \\ 4 & 2 \end{vmatrix} = 2$ then value of 'x' is	i) 7
B) If ${}^nP_3 = 210$ then value of 'n' is	ii) $\frac{\sqrt{3}-1}{2\sqrt{2}}$
C) Third proportional of 4,6 is	iii) 2
D) $sin15^0$ is	iv) 1
E) $\frac{sin4x+2}{sin2x+1}$	v) $\frac{\sqrt{3}+1}{2\sqrt{2}}$
	vi) 9

Solution:
A) 1
B) 7
C) 9
D) $\frac{\sqrt{3}-1}{2\sqrt{2}}$
E) 2

III. For questions 12 to 16 choose the appropriate answer from the given options: $(\mathbf{5 \times 1 = 5})$

(35,1,3,30,16)

12. If $\begin{bmatrix} -9 \\ 2 \end{bmatrix} - \begin{bmatrix} 5 \\ -1 \end{bmatrix} = \begin{bmatrix} -14 \\ x \end{bmatrix}$ then value of 'x' is

Ans: 3

13. The number of diagnosis in a decagon is

Ans: 35

14. If $5:20 = 3:x$ $then\ 'x'$ = _____

Ans: 12

15. Length of the latus rectum of parabola $y^2 = 16x$ is_____

Ans: 16

16. $\int_0^{\frac{\pi}{2}} sinx\, dx =$ _____

Ans: 1

IV. Answer any six questions: $(6 \times 2 = 12)$

17. Find matrix $A\ if\ 2A + B = \begin{bmatrix} 2 & 0 \\ -1 & 3 \end{bmatrix} where\ B = \begin{bmatrix} 1 & -1 \\ 3 & 0 \end{bmatrix}$.

Ans: $2A + B = \begin{bmatrix} 2 & 0 \\ -1 & 3 \end{bmatrix}$

$\Rightarrow 2A + \begin{bmatrix} 1 & -1 \\ 3 & 0 \end{bmatrix} = \begin{bmatrix} 2 & 0 \\ -1 & 3 \end{bmatrix}$

$2A = \begin{bmatrix} 2 & 0 \\ -1 & 3 \end{bmatrix} - \begin{bmatrix} 1 & -1 \\ 3 & 0 \end{bmatrix}$

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

$A = \begin{bmatrix} \frac{1}{2} & \frac{1}{2} \\ -2 & \frac{3}{2} \end{bmatrix}$

18. In how many ways can 6 people be chosen out of 10 people if one particular person is always included?

Ans: No of ways $= {}^{10-1}C_{6-1} = {}^{9}C_5$

$= \frac{9\times8\times7\times6\times5}{5\times4\times3\times2\times1} = 126$

19. If A and B are mutually exclusive events with $P(A) = \frac{2}{5}, P(B) = \frac{1}{7}. Find\ P(A \cup B)$.

Ans: $P(A \cap B) = 0$

$P(A \cup B) = P(A) + P(B)$

$= \frac{2}{5} + \frac{1}{7} = \frac{14+5}{35} = \frac{19}{35}$

20. If $a: b = 3: 4, b: c = 8: 15\ find\ a: b: c$

Ans: $a: b = 3: 4 \times 2$

$b: c = 8: 15$

$a: b = 6: 8$

$b: c = 8: 15$

$a: b: c = 6: 8: 15$

21. Banker's discount and Banker's gain on a certain bill due to after sometime are ₹1,250 and ₹50 respectively. Find the face value of the bill.

Ans: $BD = 1250$

$BG = 50$

$BG = BD - TD$

$50 = 1250 - TD$

$TD = 1200$

$F = \frac{BD \times TD}{BG}$

$F = \frac{1250\times1200}{50}$

$F =$ ₹30,000

22. Find equation of parabola given vertex is $(0,0) and\ focus\ is\ (-4,0)$.

Ans: $(-a, 0) = (-4, 0) a = 4$

Focus on $'-'ve\ X - axis$

$\Rightarrow y^2 = -4x$

$y^2 = 16x$

23. $If\ y = x^x find \frac{dy}{dx}$.

Ans: $y = x^x$

$\log y = x \log x$

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

$\frac{dy}{dx} = y[1 + logx]$

$\frac{dy}{dx} = x^x[1 + \log x]$.

24. The total cost function is given by $C = q^3 - 3q^2 + 15q + 27$ where q is output. Find the marginal cost and fixed cost.

Ans: $C = q^3 - 3q^2 + 15q + 27$

Fixed cost $= 27$

$M.C = \frac{d}{dq}\ (C)$

$M.C = 3q^2 - 6q + 15$

25. Find the area bounded by the curve $y = x^2, x - axis\ and\ lines\ x = 0, x = 1$.

Ans: $y = x^2, x = 0\ , x = 1$

$A = \int_0^1 x^2 dx$

$= \frac{x^3}{3}$

$= \frac{1}{3} - 0 = \frac{1}{3}\ sq.units$

V. Answer any six questions: $(\mathbf{6 \times 3 = 18})$

26. Solve using Cramer's rule

$2x + y = 1$

$x - 3y = 4$

Ans: $2x + y = 1$

$x - 3y = 4$

$\Delta = \begin{vmatrix} 2 & 1 \\ 1 & -3 \end{vmatrix} = -6 - 1 = -7$

$\Delta x = \begin{vmatrix} 1 & 1 \\ 4 & -3 \end{vmatrix} = -3 - 4 = -7$

$\Delta y = \begin{vmatrix} 2 & 1 \\ 1 & 4 \end{vmatrix} = 8 - 1 = 7$

$x = \frac{\Delta x}{\Delta} = \frac{-7}{-7} = 1$

$y = \frac{\Delta y}{\Delta} = \frac{7}{-7} = -1$

27. Find the number of permutations of the letters of the word ENGINEERING. How many of these

A) begin with GIN and end with GRIN

Ans: Total = 11

$t \rightarrow 3\ N - 3\ G - 2I - 2$

Total permutations = $\frac{111}{3631.21.21}$

A) begin with GIN and end with GRIN

GIN ……GRIN

REMAINING LETTERS = 4

E = 3

Permutations = $\frac{4!}{3!}$

B) have all 3 E's together.

Ans: $3E's$ together

E	E	E

+ 8 remaining letters.

Total = 9

N- 3 G – 2 I – 2

Permutations = $\frac{9!}{3!2!2!}$

28. 3 Carpenters can earn ₹360 in 6 days working 9 hours a day. How much will 8 carpenters earn in 12 days working 6 hours a day?

Ans:

Persons	Days	Hours	Earnings
3	6	9	360
8	12	6	x

All are in direct proportions.

$\therefore \frac{3}{8} \times \frac{6}{12} \times \frac{9}{6} = \frac{360}{x}$

$\frac{162}{576} = \frac{360}{x}$

$x = 1280$

Earnings = ₹1280

29. Banker's gain on a bill due after 6 months at 4% p.a. is ₹24. Find true discount, Banker's discount and face value of the bill.

Ans: $BG = ₹24 \quad r = 0.04$

$t = \frac{6}{12} = 0.5$

TD= ? BD= ? F =?

$BG = TD.tr$

$24 = TD.(0.5 \times 0.04)$

$TD = ₹1200$

$BD = BG + TD$

$BD = 24 + 1200$

$BD = ₹\,1224$

$F = \frac{BD \times TD}{BG}$

$F = \frac{1{,}224 \times 1{,}200}{24}$

$F = ₹61{,}200$

30. Pathik sells out ₹6,000 of 7.5% stock at ₹108 and reinvests the proceeds in 9% stock. If his income increases by ₹270, at what price did he buy 9% stock?

Ans: $Original\ income = \frac{7.5 \times 6000}{100}$

$= ₹\,450$

New Income = $450 + 270 = ₹720$

<u>Money obtained by selling stock</u>

F.V	M. V
100	108
6000	x

Money obtained = ₹6,480

<u>M.V of 9% stock</u>

M. V	Income
6480	720
x	9

M.V of 9% stock = $\frac{9\times6480}{720} = ₹81$

31. The price of a washing machine inclusive of sales tax is ₹13,530 if the sales tax is 10%. Find the basic price.

Ans: $SP = ₹13530$

$ST = 10\%$

$ST\% = 10\%$

Let MP = ₹x

SP = MP +ST% MP

$13530 = x + 10\%x$

13530= 1.1x

$x = ₹12,300$

$\therefore MP = ₹12,300$

32. The edge of a variable cube is increasing at the rate of 6 cm/min. how fast is the volume and its surface area increasing when the edge is 10 cm long?

Ans: Let edge = $x\ c.m$

$\frac{dx}{dt} = 6.cm/min$

$\frac{dv}{dt} = ?\ \frac{ds}{dt} = ?\quad x = 10cm$

$V = x^3$

$\frac{dv}{dt} = 3x^2\frac{dx}{dt} = 3 \times 100 \times 6$

$= 1800\ c.c/min$

$S = 6x^2$

$\frac{ds}{dt} = 12x\frac{dx}{dt} = 12 \times 10 \times 6$

$= 720\ c.m^2/min$

33. Evaluate: $\int \frac{x}{(x-1)(x-2)}dx.$

Ans: $\int \frac{x}{(x-1)(x-2)} = \int \frac{A}{x-1}dx + \int \frac{B}{x-2}\ dx$

$\frac{x}{(x-1)(x-2)} = \frac{A}{x-1} + \frac{B}{x-2}$

$x = A(x-2) + B(x-1)$

Put $x = 1$

$1 = A(-1) \Rightarrow A = -1$

Put $x = 2$

$2 = B(1) \Rightarrow B = 2$

$I = \int \frac{-1}{x-1} dx + \int \frac{2}{x-2} dx$
$I = -\log(x-1) + 2\log(x-2) + C$

34. Evaluate: $\int_1^2 (x + e^x + 2)dx$.

Ans: $\int_1^2 (x + e^x + 2dx$
$= \frac{x^2}{2} + e^x + 2x \mid$
$= \left(\frac{4}{2} + e^2 + 4\right) - (\frac{1}{2} + e + 2)$
$= 2 + e^2 + 4 - \frac{1}{2} - e - 2 = e^2 + \frac{7}{2}$

PART- D

VI. Answer any four questions: $(\mathbf{4 \times 5 = 20})$

35. Solve by matrix method

$3x + 2y - z = 6$
$3x + y - 2z = 3$
$2x - 3y - z = -1$

$$A = \begin{bmatrix} 3 & 2 & -1 \\ 3 & 1 & -2 \\ 2 & -3 & -1 \end{bmatrix} B = \begin{bmatrix} 6 \\ 3 \\ -1 \end{bmatrix} X = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$$

$|A| = 3(-1-6) - 2(-3+4) - 1(-9-2)$

$|A| = -21 - 2 + 11 = -12$

$A_{11} = (-1-6) = -7$

$A_{12} = -(-3+4) = -1$

$A_{13} = -9 - 2 = -11$

$A_{21} = -(-2-3) = 5$

$A_{22} = -3 + 2 = -1$

$A_{23} = -(-9-4) = 13$

$A_{31} = -4 + 1 = -3$

$A_{32} = (-6+3) = 3$

$A_{33} = 3 - 6 = -3$

$$adjA = \begin{bmatrix} -7 & -1 & -11 \\ 5 & -1 & 13 \\ -3 & 3 & -3 \end{bmatrix}^T$$

$$adj = \begin{bmatrix} -7 & 5 & -3 \\ -1 & -1 & 3 \\ -11 & 13 & -3 \end{bmatrix}$$

$A^{-1} = \frac{1}{|A|}\ adjA$

$$A^{-1} = \frac{1}{-12}\begin{bmatrix} -7 & 5 & -3 \\ -1 & -1 & 3 \\ -11 & 13 & -3 \end{bmatrix}$$

$X = A^{-1}B$

$$X = \frac{1}{-12}\begin{bmatrix} -7 & 5 & -3 \\ -1 & -1 & 3 \\ -11 & 13 & -3 \end{bmatrix}\begin{bmatrix} 6 \\ 3 \\ -1 \end{bmatrix}$$

$$X = \frac{1}{-12}\begin{bmatrix} -42 & +15 & +3 \\ -6 & -3 & -3 \\ -66 & +39 & +3 \end{bmatrix}$$

$$X = \frac{1}{-12}\begin{bmatrix} -24 \\ -12 \\ -24 \end{bmatrix}$$

$$X = \begin{bmatrix} 2 \\ 1 \\ 2 \end{bmatrix}$$

$x = -2$ $\qquad$ $y = 1$ $\qquad$ $z = 2$

36. Resolve into partial fractions $\frac{9}{(x+1)(x+2)^2}$

Ans: $\frac{9}{(x+1)(x+2)^2} = \frac{A}{(x+1)} + \frac{B}{(x+2)} + \frac{C}{(x+2)^2}$

$9 = A(x+2)^2 + B(x+1)(x+2) + C(x+1)$

Put $x = -1$

$9 = A(1) \Rightarrow A = 9$

Put $x = -2$

$9 = C(-1) \Rightarrow C = -9$

Comparing co-ef x^2

$O = A + B$

$O = 9 + B$

$B = -9$

$\therefore \frac{9}{(x+1)(x+2)^2} = \frac{9}{x+1} - \frac{9}{x+2} - \frac{9}{(x+2)2}$

37. Verify whether the propositions $(p \wedge \sim q)Vq\ and\ pVq$. are logically equivalent.

p	**q**	**~q**	$\boldsymbol{P \cap \sim q}$	$\boldsymbol{(P \cap \sim q) \cup q}$	$\boldsymbol{p \cup q}$
T	T	F	F	T	T
T	F	T	T	T	T
F	T	F	F	T	T
F	F	T	F	F	F

$\therefore$ propositions are logically equalent.

38. An Engineering company has 80% leaning effect and spends 1000 hours to produce 1 lot of the product. Estimate the labour cost of producing 8 lots of the product if the labour cost is ₹40 per hour.

Ans:

Units Produced	Total in units	Cumulative average time per unit (hours)	Total Hours
1	1	1000	1000
1	2	80%of 1000=800	1600
2	4	80%80 = 640	2560
4	8	80% of 640 = 512	4096

Total hours to produce 8 lots = 4096 hrs

Total labour cost at ₹ 40 per hr = $4096 \times 40 = ₹1,63,840$

39. Solve the LPP graphically.

Maximize $Z = 10500x + 9000y$

Subject to the constraints

$x + y \leq 50$

$2x + y \leq 80$

$x, y \geq 0.$

Ans: $Z = 10500x + 9000y$

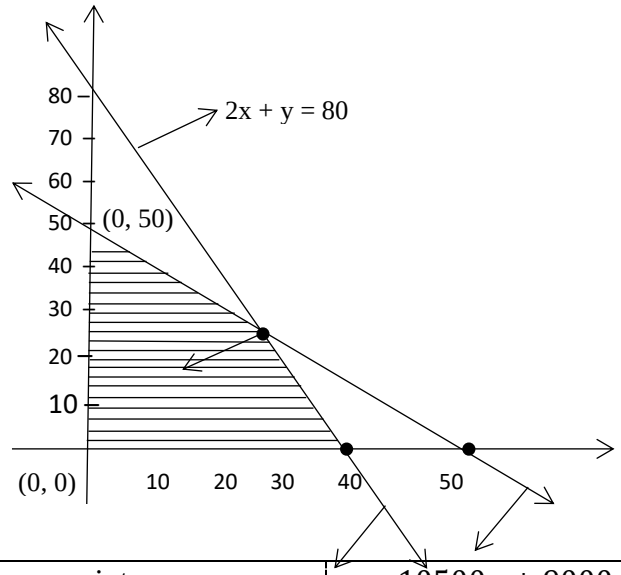
$x + y \leq 50$

$2x + y \leq 80$

$x, y \geq 0$

$x + y = 50$ $\qquad$ $2x + y = 80$

(0,50) and (50,0) $\qquad$ (0,80) and (40,0)



Corner points	$z = 10500x + 9000y$
(0,50)	450000
(0,0)	0
(40,0)	420000
(30,20)	495000

Z max $= 495000 at (30,20)$

40. Prove that $\frac{cos7x+cos3x-cos5x-cosx}{sin7x-sin3x-sin5x+sinx} = cot2x.$

Ans: $\frac{cos7x+cos3x-(cos5x+cosx)}{(sin7x-sin3x)-(sinx5x-sinx)}$

$= \frac{2cos5xcos2x-2cos3xcos2x}{2\cos 5x2x-2\ cos3xsin2x}$

$= \frac{2cos2x(cos5x-cos3x)}{2sin2x(cos5x-cos3x)}$

$= cot2x$

41. If $y = x + \sqrt{x^2-1} show\ that\ (x^2-1)y_2 + xy_1 - y = 0.$

Ans: $y = x + \sqrt{x^2-1}$

$y_1 = 1 + \frac{1}{2\sqrt{x^2-1}} \times 2x$

$y_1 = \frac{\sqrt{x^2-1}+x}{\sqrt{x^2-1}}$

$y_1\sqrt{x^2-1} = \sqrt{x^2-1} + x$

$y_1 \times \frac{1}{2\sqrt{x^2-1}} \times 2x + \sqrt{x^2-1}\, y_2 = 1 + \frac{1}{2\sqrt{x^2-1}} \times 2x$

$\frac{xy_1}{\sqrt{x^2-1}} + \sqrt{x^2-1}\, y_2 = \frac{\sqrt{x^2-1}+x}{\sqrt{x^2-1}}$

$\frac{xy_1}{\sqrt{x^2-1}} + \sqrt{x^2-1}\, y_2 = \frac{y}{\sqrt{x^2-1}}$

$Multiplying\ by\ \sqrt{x^2-1}$

$xy_1 + (x^2-1)y_2 \quad = y$

$(x^2-1)y_2 + xy_1 - y = 0$

PART- E

VII. Answer the following questions:

42. Prove that $\lim_{x\to a}\left(\frac{X^n-a^n}{X-a}\right) = n.a^{n-1}$ for all rational values of 'n'. (6)

43. Proof:

Case 1: Let n be a positive integer.

$x^n - a^n = (x-a)(x^{n-1} + x^{n-2}.a + x^{n-3}a^2 + \cdots + a^{n-1}) \div by(x-a)$ and apply $lim\ x \to a$ on both sides

$$\therefore \lim_{x\to a}\left[\frac{x^n-a^n}{x-a}\right] = \lim_{x\to a}\left[\frac{(x-a)(x^{n-1}+x^{n-2}a+\cdots a^{n-1})}{x-a}\right]$$

$$= \lim_{x\to a}[x^{n-1}+x^{n-2}a+\cdots a^{n-1}]$$

$$= a^{n-1}+a^{n-2}a+\cdots+a^{n-1}$$

$$= a^{n-1}+a^{n-1}+\cdots+a^{n-1}$$

$$= n.a^{n-1}$$

$$\therefore \lim_{x\to a}\left[\frac{x^n-a^n}{x-a}\right] = n.a^{n-1}$$

Case2: Let n be a negative integer

Put $n = -m, m > 0$

Consider $\frac{x^n-a^n}{x-a} = \frac{x^{-m}-a^{-m}}{x-a}$

$= \left[\frac{\frac{1}{x^m}-\frac{1}{a^m}}{x-a}\right]$

$= \frac{a^m-x^m}{x^m a^m(x-a)}$

$= \frac{-1}{a^m x^m}\left(\frac{x^m-a^m}{x-a}\right)$ apply $limx \to a$ on both sides

$$\therefore \lim_{x\to a}\left[\frac{x^n-a^n}{x-a}\right] = \lim_{x\to a}\frac{1}{a^m x^m}\left(\frac{x^m-a^m}{x-a}\right)$$
$$= \frac{1}{a^m a^m} m.a^{m-1}[By\ case\ 1]$$
$$= (-m)\frac{a^{m-1}}{a^{2m}} = (-m)a^{-m-I}$$
$$= n.a^{n-1}[\because -m = n]$$
$$\therefore \lim_{x\to a}\left[\frac{x^n-a^n}{x-a}\right] = n.a^{n-1}$$

Case3: Let $n = \frac{p}{q}$ where p and q are integers and $q \neq 0$

$$\therefore \lim_{x\to a}\left[\frac{x^n-a^n}{x-a}\right] = \lim_{x\to a}\left[\frac{x^{p/q}-a^{p/q}}{x-a}\right]$$
$$= \lim_{x\to a}\frac{\left(x^{\frac{t}{q}}\right)^p - \left(a^{t/q}\right)^p}{x-a}$$

Let $x^{t/q} = y\ and\ a^{t/q} = b$

$\Rightarrow x = y^q\ and\ a = b^q$

Also $x \to a$ changes to $y \to b$

$$\therefore \lim_{x\to a}\left[\frac{x^n-a^n}{x-a}\right] = \lim_{y\to b}\left[\frac{y^p-b^p}{y^q-b^q}\right]$$
$$= \lim_{y\to b}\left[\frac{\frac{y^p-b^p}{y-b}}{\frac{y^p-b^q}{y-b}}\right]$$
$$= \frac{p.b^{p-1}}{q.b^{q-1}} \text{ (by case 1)}$$
$$= \frac{p}{q}.b^{p-1-q+1} = \frac{p}{q}.b^{p-q}$$
$$= \frac{p}{q}.\left(a^{I/q}\right)^{p-q} = \frac{p}{q}.a^{p/q-1}$$
$$= n.a^{n-1}[\because p/q = n]$$
$$\because \lim_{x\to a}\left[\frac{x^n-a^n}{n-a}\right] = n.a^{n-1}$$

Hence the result is true for all rational values of n

OR

Show that the points $(2,-4)(3,-1)(3,-3)(0,0)$ are concyclic.

Ans: $x^2 + y^2 + 2gx + 2fy + c = 0$

$(0,0) \Rightarrow C = 0$

$(2,-4) \Rightarrow 4 + 16 + 49 - 8f = 0$

$49 - 8f = -20$

$g - 2f = -5$

$(3,-1) \Rightarrow 9 + 1 + 69 - 2f = 0$

$6g - 2f = -10$

$3g - f = -5$

$(1) \times 3 \Rightarrow 3g - 6f = -15$

$$\begin{array}{l} 3g-f=-5 \\ \underline{(-)(+)(+)} \\ -5f=-10 \end{array}$$

$\Rightarrow f = 2$

Sub in (1)

$g - 4 = -5$

$g = -1$

Substituting,

$x^2 + y^2 - 2x + 4y = 0$ ……..(2)

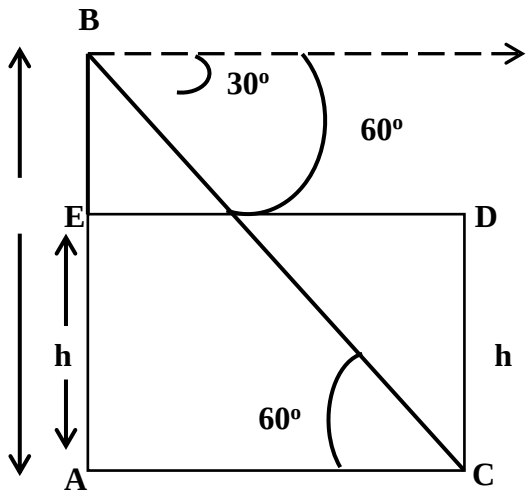
Take (3,-3) in LHS of (2)

$9 + 9 - 6 - 12 = 0$

$\therefore$ Points are concyclic

44. A person is at top of a tower 75 feet high. From there he observes a vertical pole and finds the angles of depression of top and bottom of the pole are 30^0 and 60^0 respectively. Find the height of the pole. (4)

Ans:



Here $AC = DE$ and $BE = 75 - h\ CD =?$

From $traingle\ \ BED$

$tan30^0 = \frac{BE}{DE}\ \frac{1}{\sqrt{3}} = \frac{BE}{AC}$

$AC = \sqrt{3}, BE$

From triangle BAC $tan60 = \frac{AB}{AC}$

$\sqrt{3} = \frac{75}{AC}$

$AC = \frac{75}{\sqrt{3}}$

$in\ (1)$

$\sqrt{3}BE = \frac{75}{\sqrt{3}}$

$BE = \frac{75}{3}\ \ BE = 25$

$\therefore CD = 75 - 25$

$CD = 50$ Therefore height of the pole is 50m.

OR

Find the value of $(1.1)^4$ using binominal theorem upto 4 decimal places.

$(1.1)^4 = (1 + 0.1)^4$

$= {}^4C_0 + {}^4C_1(0.1) + {}^4C_2(0.1)^2 + {}^4C_3(0.1)^3 + {}^4C_4(0.1)^4$

$= 1 + 4(0.1) + 6 \times (0.01) + 4(0.001) + 1(0.0001)$

$= 1.4641$