1 b) எண்ணிலடங்கா உறுப்புகள் உள்ளன

2 c) 512

3 d) ஒன்றுமில்லை

4 b) (2 ∞)

5 a) $\sqrt{k^2-4c}$

6 d) 4

7 a) $1+\sqrt{2}$

8 a) $[1 \quad \sqrt{2}]$

9 a) $b \leq \sqrt{2}$ எனில் b^2-1

10 a) $1:\sqrt{3}:2$ (எ.கா 3.59)

11 d) $\gamma!$

12 c) 11

13 d) 1296

14 a) 600

15) d) $n(n+1)$

16 c) $\frac{-4}{15}$

17 b) பெருக்கீடு (பக்-263)

18 b) (1 2)

19 a) (-3 -2)

20 c) $a+b=0$ (பக்-331)

21 $n[A \Delta B] = n(A \cup B) - n(A \cap B) = 10-3$

$n[P(A \Delta B)] = 2^7 = 128$.

22 $\alpha+\beta=4 \quad \alpha\beta=-21$

தேவையான சமன்பாடு $x^2-4x-21=0$

23 $\sin(45+\theta) - \sin(45-\theta)$

$= 2\cos 45 \sin\theta = 2 \cdot \frac{1}{\sqrt{2}} \sin\theta$

$= \sqrt{2}\sin\theta$

24) $s = 21 \quad s-a = 8 \quad s-b = 7 \quad s-c = 6$

$A = \sqrt{21 \times 8 \times 7 \times 6} = \sqrt{3 \times 7 \times 4 \times 2 \times 7 \times 3 \times 2}$

$= 3 \times 7 \times 4 = 84$

25) $\frac{1}{7!} + \frac{1}{8!} = \frac{A}{9!}$ $\boxed{A=81}$

$\frac{8 \times 9}{9!} + \frac{9}{9!} = \frac{A}{9!} \Rightarrow \frac{81}{9!} = \frac{A}{9!}$

26) $(102)^4 = (100+2)^4 = (100)^4 + 4(100)^3 2 + 6(100)^2(4) + 4(100)8 + 16.$

$= 100000000 + 8000000 + 240000 + 3200 + 16.$

$= 108243216$

27) $e^{5x} = 1 + \frac{5x}{1!} + \frac{(5x)^2}{2!} + \frac{(5x)^3}{3!} + \frac{(5x)^4}{4!} + \frac{(5x)^5}{5!} + \ldots$

28) (0 0) க்கும் $5x+12y-3=0$ க்கும் இடைவெளியின் நீளம்

$d = \frac{|5(0)+12(0)-3|}{\sqrt{25+144}} = \frac{3}{13}$

29) $3x+2y+9=0, \quad 12x+8y-15=0$

$m_1 = -\frac{3}{2} \qquad m_2 = -\frac{12}{8} = \frac{-3 \times 4}{2 \times 4}$

$m_2 = -\frac{3}{2}$

$m_1 = m_2$ இணை

30) வரிசை மாற்றங்கள் $= \frac{11!}{4!4!2!} = 34650$

31) $fog = f(g(x)) = f(x^2+3) = 3x^2+9-4$

$fog = 3x^2+5$

$gof = g[3x-4] = (3x-4)^2+3$

$= 9x^2 - 24x + 16 + 3 = 9x^2 - 24x + 19$

32) $x = \sqrt{2}+\sqrt{3} \Rightarrow x^2 = 5+2\sqrt{6}$

$\frac{x^2+1}{x^2-2} = \frac{6+2\sqrt{6}}{3+2\sqrt{6}} \times \frac{3-2\sqrt{6}}{3-2\sqrt{6}}$

$= \frac{18-12\sqrt{6}+6\sqrt{6}-4\times 6}{9-4\times 6}$

$= \frac{-6-6\sqrt{6}}{-15} = \frac{2+2\sqrt{6}}{5}$

LHS

33) $= \sin^2\frac{\pi}{18} + \sin^2\frac{\pi}{9} + \sin^2\frac{7\pi}{18} + \sin^2\frac{4\pi}{9}$

$= \sin^2\frac{\pi}{18} + \sin^2\frac{\pi}{9} + \sin^2\left(\frac{\pi}{2} - \frac{\pi}{18}\right) + \sin^2\frac{7\pi}{18}$

$= \sin^2\frac{\pi}{18} + \cos^2\frac{\pi}{18} + \sin\frac{\pi}{9} + \sin^2\frac{7\pi}{18}$

$= 1 + \sin\left(\frac{\pi}{2} - \frac{7\pi}{18}\right) + \sin^2\frac{7\pi}{18}$

$= 1 + \cos\frac{7\pi}{18} + \sin^2\frac{7\pi}{18} = 1+1$

$= 2$ RHS

34) $\frac{\sin 75 - \sin 15}{\cos 75 + \cos 15}$

$= \frac{2\cos\frac{90}{2}\sin\frac{60}{2}}{2\cos\frac{90}{2}\cos\frac{60}{2}} = \frac{\sin 30}{\cos 30}$

$= \tan 30 = \frac{1}{\sqrt{3}}$

35) LHS $= {}^{2n}C_n = \frac{(2n)!}{n!\,n!}$

$= \frac{1\cdot 2\cdot 3\cdot 4\cdot 5\cdot 6\cdots 2n}{n!\,n!}$

$= \frac{2\cdot 4\cdot 6\cdots 2n \;\; 1\cdot 3\cdots 2n-1}{n!}$

$= \frac{2^n \cdot 1\cdot 2\cdot 3\cdots n \;\; 1\cdot 3\cdot 5\cdots 2n-1}{n!\,n!}$

$= \frac{2^n \cdot 1\cdot 3\cdot 5\cdots 2n-1}{n!}$

36) $6 + 66 + 666 + \cdots$

$= 6[1 + 11 + 111 + \cdots$

$= \frac{6}{9}[9 + 99 + 999 + \cdots$

$= \frac{6}{9}[10-1 + 100-1 + 1000-1 + \cdots$

$= \frac{6}{9}\left[\frac{(10)(10^n-1)}{10-1} - n\right]$

$= \frac{2}{3}\left[\frac{10}{9}(10^n-1) - n\right]$

37) $\sqrt[3]{65} = (64+1)^{1/3}$

$= (64)^{1/3}\left[1 + \frac{1}{64}\right)^{1/3}$

$= 4\left(1 + \frac{1}{3}\cdot\frac{1}{64}\right)$ etc.

$= 4 + \frac{1}{48} = 4.02$

43 | 100 (2.02
86
40

38) $\frac{x}{a} + \frac{y}{1-a} = 1 \quad \frac{8}{a} + \frac{3}{1-a} = 1$

$\frac{8 - 8a + 3a}{a - a^2} = 1$

$8 - 5a = a - a^2$

$a^2 - 6a + 8 = 0$

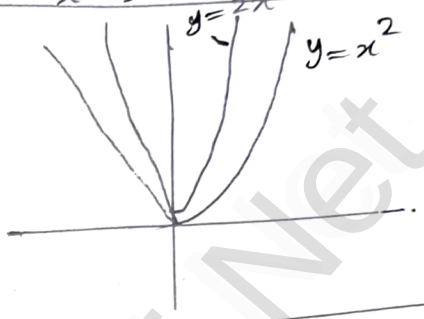
$(a-4)(a-2) = 0 \quad a = 2, 4$

$a = 2 \quad b = -1 \qquad a = 4, \; b = -3$

$\frac{x}{2} + \frac{y}{-1} = 1 \qquad \frac{x}{4} - \frac{y}{3} = 1$

$x - 2y = 2 \qquad 3x - 4y = 12$

39)



40) $-5t^2 + 100t = 495$

$5t^2 - 100t + 495 = 0$

$t^2 - 20t + 99 = 0$

$(t-11)(t-9) = 0$

$t = 9, 11$

41) a) $a \in \mathbb{Z}$ $\quad m \in \mathbb{Z}$

$m - m = 0 = 7(0)$

$\Rightarrow mRm$

Symmetric: $mRn \Leftrightarrow m - n = 7k$

$n - m = -7k$

$= 7(-k)$

nRm

Transitive: $mRn, \; nRl$

$m - n = 12k_1 \qquad n - l = 12k_2$

$m - n + n - l = 12(k_1 + k_2)$

$m - l = 12(k_1 + k_2)$

mRl

41 b) $A + B = 45$

$\frac{\tan A + \tan B}{1 - \tan A \tan B} = 1$

$\tan A + \tan B = 1 - \tan A \tan B$

$\tan A + \tan B + \tan A \tan B = 1$

$\tan A(1 + \tan B) + 1 + \tan B = 2$

$(1 + \tan A)(1 + \tan B) = 2$

42 a) $\frac{7+x}{(1+x)(1+x^2)} = \frac{Ax+B}{1+x^2} + \frac{C}{1+x}$

$7+x = (Ax+B)(1+x) + C(1+x^2)$

$A = -3 \quad B = 4 \quad C = 3$

$\frac{7+x}{(1+x)(1+x^2)} = \frac{4-3x}{1+x^2} + \frac{3}{1+x}$

42b

G	A	R	D	E	N
4	1	6	2	3	5
5!	4!	3!	2!	1!	0!
3	0	3	0	0	0

$3 \times 5! + 3 \times 3! + 1 = 3 \times 120 + 3 \times 6 + 1$

$= 360 + 18 + 1$

$= 379$

2	1	5	4	3	6
D	A	N	G	E	R
1	0	2	1	0	0

$1 \times 5! + 2 \times 3! + 1 \times 2! + 1$

$120 + 12 + 2 + 1 = 135$

43a $A+B+C = \pi \Rightarrow \frac{A+B+C}{2} = \pi/2$

$\tan\left(\frac{A}{2}+\frac{B}{2}\right) = \tan\left(\frac{\pi}{2} - \frac{C}{2}\right)$

$\frac{\tan\frac{A}{2} + \tan\frac{B}{2}}{1 - \tan\frac{A}{2}\tan\frac{B}{2}} = \cot\frac{C}{2}$

$\tan\frac{A}{2} + \tan\frac{B}{2} = \cot\frac{C}{2}\left(1 - \tan\frac{A}{2}\tan\frac{B}{2}\right)$

$\tan\frac{C}{2}\tan\frac{A}{2} + \tan\frac{C}{2}\tan\frac{B}{2} = 1 - \tan\frac{A}{2}\tan\frac{B}{2}$

$\tan\frac{A}{2}\tan\frac{B}{2} + \tan\frac{B}{2}\tan\frac{C}{2} + \tan\frac{C}{2}\tan\frac{A}{2} = 1$

43b $\sqrt{\frac{1-x}{1+x}} = (1-x)^{1/2}(1+x)^{-1/2}$

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

$\left(1 - \frac{x}{2} + \frac{\frac{1}{2}\cdot\frac{3}{2}}{2!}x^2\right)$ ஆல்

$= \left(1 - \frac{x}{2} - \frac{x^2}{8}\right)\left(1 - \frac{x}{2} + \frac{3}{8}x^2\right)$

$= 1 - \frac{x}{2} - \frac{x^2}{8} - \frac{x}{2} + \frac{x^2}{4} - \frac{x^2}{8}$

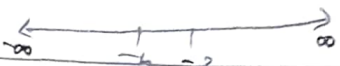
$= 1 - x + x^2/2$ ஆகும்

44a $\frac{x+1}{x+3} < 3$

$\frac{x+1}{x+3} - 3 < 0$

$\frac{x+1-3x-9}{x+3} < 0$

$\frac{-2x-8}{x+3} < 0 \quad \frac{x+4}{x+3} > 0$



	$x+4$	$x+3$	பலன்
$(-\infty\ -4)$	−	−	+
$(-4\ -3)$	+	−	−
$(-3\ \infty)$	+	+	+

$x \in (-\infty\ -4) \cup (-3\ \infty)$

44b $\left(x^2 - \frac{1}{x^3}\right)^6$

$T_{r+1} = {}^6C_r (x^2)^{6-r} \left(\frac{-1}{x^3}\right)^r$

$= {}^6C_r\, x^{12-2r} (-1)^r x^{-3r}$

$= {}^6C_r\, x^{12-5r} (-1)^r$

x^2 ன் கெடு $2 = 12 - 5r$ $\boxed{r=2}$

x^6 ன் கெடு $6 = 12 - 5r \quad r = 6/5$ ✗

$\therefore x^6$ன் கெடு இல்லை

x^2ன் கெடி $= {}^6C_2 (-1)^2 = \frac{6\times5}{1\times2} = 15$

45a $3x+4y+2=0$

$-5x-12y+5=0$

இரு சமன்பாடுகளின் சேர்ப்பு

$\frac{3x+4y+2}{\sqrt{9+16}} = \pm\frac{-5x-12y+5}{\sqrt{25+144}}$

$\frac{3x+4y+2}{5} = \pm\frac{(-5x-12y+5)}{13}$

$39x+52y+26 = \pm(-25x-60y+25)$

$64x+112y+1=0$

45b $f(x) = 3x-5$

$y = 3x-5$

$\frac{y+5}{3} = x$

$g(x) = \frac{x+5}{3}$

$fog = f\left[\frac{x+5}{3}\right]$

$= 3\left(\frac{x+5}{3}\right) - 5$

$= x+5-5 = x$

III) $gof = x$

$f^{-1} = g \Rightarrow f$ இன்வெர்ஸ் ஆகும்.

46 a

$LHS = \log\frac{75}{16} - 2\log\frac{5}{9} + \log\frac{32}{243}$

$= \log\frac{75}{16} \times \frac{32}{243} - \log\frac{25}{81}$

$= \log\frac{25}{81} - \log\frac{25}{81}$

$= \log 2 \times \frac{25}{81} \times \frac{81}{25} = \log 2$

$= RHS$

ii) $a^2 - 4(a+2) = 0$

$a^2 - 4a - 8 = 0$

$a = \frac{4 \pm \sqrt{16+32}}{2} = \frac{4 \pm \sqrt{48}}{2}$

$= 4 \pm \frac{4\sqrt{3}}{2} = 2 \pm 2\sqrt{3}$

46 b

$abc + 2fgh - af^2 - bg^2 - ch^2$

$= 2(-3)(-20) + 2\frac{19}{2}(-3)\frac{-1}{2} - 2\left(\frac{19}{4}\right)^2 - (-3)\left(\frac{-3}{2}\right)^2 + 20(-1)^2$

$= 0$

இரட்டை நேர்க்கோடு

$2x^2 - xy - 3y^2 = 2x^2 + 2xy - 3xy - 3y^2$

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

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

$2x - 3y + l = 0, \quad x + y + m = 0$

$2m + l = -6, \quad -3m + l = 19$

$-5m = -25 \quad \boxed{m = -5}$

$\boxed{l = 4}$

சமன்பாடு $2x - 3y + 4 = 0$

$x + y - 5 = 0$

47 a

$\tan\left(\frac{A-B}{2}\right) = \frac{a-b}{a+b}\cot\frac{C}{2}$

$\tan\left(\frac{B-C}{2}\right) = \frac{b-c}{b+c}\cot\frac{A}{2}$

$\tan\left(\frac{C-A}{2}\right) = \frac{c-a}{c+a}\cot\frac{B}{2}$

$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} = 2R$

$\frac{a-b}{a+b}\cot\frac{C}{2} = \frac{2R\sin A - 2R\sin B}{2R\sin A + 2R\sin B}\cot\frac{C}{2}$

$= \frac{2\cos\frac{A+B}{2}\sin\left(\frac{A-B}{2}\right)}{2\sin\frac{A+B}{2}\cos\left(\frac{A-B}{2}\right)}\cot\frac{C}{2}$

$= \cot\left(\frac{A+B}{2}\right)\tan\left(\frac{A-B}{2}\right)\cot\frac{C}{2}$

$= \tan\left(\frac{A-B}{2}\right)$

47 b

$P(n) = x^{2n} - y^{2n}$

$P(1) = x^2 - y^2 = (x+y)(x-y)$

P(1) உண்மை

P(k) உண்மை எனக

$x^{2k} - y^{2k} = (x+y)m$

$x^{2k} = (x+y)m + y^{2k}$

$P(k+1) = x^{2k} \cdot x - y^{2k} \cdot y$

$= ((x+y)m + y^{2k})x - y^{2k} \cdot y$

$= xm(x+y) + xy^{2k} - y^{2k} \cdot y$

$= (x+y)(xm + y^{2k})$

P(k+1) உண்மை

எனவே கணிதத்தூண்டல் விதியின் படி எல்லை