XI (comm) $= n(U) - [n(A) + n(B) - n(A \cap B)]$

$= 700 - (200 + 300 - 100) = 300$

Marking Scheme

Q1 A = Set of letters of the word "CATARACT" = {A, C, R, T}

B = " " " " " "TRACT" = {A, C, R, T}

∴ Clearly A = B

Q2 $4^2 - \sqrt{4} = 16 - 2 = 14$

$\frac{9^2}{\sqrt{9}} = \frac{81}{3} = 27$

Q3 no. of subsets of Set A $= 2^m$

" " " " B $= 2^n$

$2^m - 2^n = 56$

$2^n (2^{m-n} - 1) = 2^3 (2^3 - 1)$

$n = 3$, $m - n = 3$

$n = 3$, $m = 6$

Q4 $U = 700$, $n(A) = 200$, $n(B) = 300$

$n(A \cap B) = 100$. $n(A' \cap B') = ?$

$n(A \cup B) = n(A) + n(B) - n(A \cap B)$

$= 200 + 300 - 100$

$n(A \cup B) = 400$

$n(A \cup B)' = n(A' \cap B')$

$U = n(A \cup B) + n(A \cup B)'$

$700 = n(A \cup B) + n(A' \cap B')$

$700 - 400 = n(A' \cap B')$

$300 = n(A' \cap B')$

Q5 f(x) is defined if $x - 1 \geq 0 \Rightarrow x \geq 1$

Domain of f = $[1, \infty)$

Range

$y = \sqrt{16 - x^2}$ $\Rightarrow y^2 + 1 = x$

$x \geq 1$, $y^2 + 1 \geq 1 \Rightarrow y^2 \geq 0$ $[0, \infty)$

$y \geq 0$ or $y = \sqrt{x-1}$

6. $|5-4x| > 8$

$5-4x > 8$ or $5-4x < -8$

$5 - 8 > 4x$ | $5-4x < -8$

$4x < -3$ | $5+8 < 4x$

$x < -\frac{3}{4}$ | $13 < 4x$

$x \in (-\infty, -\frac{3}{4})$ | $x > \frac{13}{4}$

$x \in (\frac{13}{4}, \infty)$

S.S. $(-\infty, -\frac{3}{4}) \cup (\frac{13}{4}, \infty)$

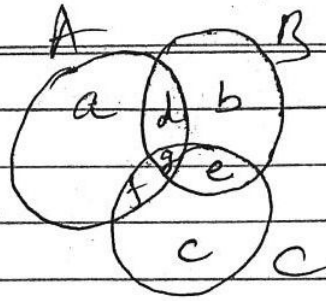
7. $y - \sqrt{3}x - 5 = 0$, $\sqrt{3}y - x + 6 = 0$.

$m_1 = \sqrt{3}$, $m_2 = \frac{1}{\sqrt{3}}$

$\tan\theta = \left| \frac{\frac{1}{\sqrt{3}} - \sqrt{3}}{1 + \sqrt{3} \times \frac{1}{\sqrt{3}}} \right| = \frac{1}{\sqrt{3}}$

$\theta = 30°$, $\beta = 30 = 150°$

8.



$n(A) = 21$, $n(B) = 26$, $n(C) = 29$

$n(A \cap B) = 14$, $n(C \cap B) = 12$

$n(B \cap C) = 14$, $n(A \cap B \cap C) = g$

$a + d + f + g = 21$

$b + d + e + g = 26$

$c + e + f + g = 29$

$d + g = 14$

$f + g = 12$

$e + g = 14$ $\quad g = 8$

$e = 6$

$f = 4$.

no. of people product can't = $n(C) - g - e - f$

$= 29 - 8 - 6 - 4$

$= 11$

9 (i) $\{7, 9\}$

(ii) $\{7, 9, 11\} \cap \{7, 9, 11, 13, 15\}$
$= \{7, 9, 11\}$

(iii) $\{3, 5, 7, 9, 11, 15, 17\} \cap \{7, 9, 11, 13, 15\}$
$= \{7, 9, 11, 15\} \cap \{11, 13\}$
$= \{11\}$

12 $\frac{x}{4} + \frac{y}{5} = 1$

$3x + 4y = 12a$

$(-3, -4) \rightarrow 12a = -17$

$a = -\frac{17}{12}$

$3x + 4y + 17 = 0$

b $\frac{15}{100}(x + 500) < \frac{30}{100} \times x + \frac{12}{100} \times 500 < \frac{10}{100}(x + 500)$

$15x + 7500 < 30x + 6000 < 10x + 8000$

first two terms $x > 100$

last two terms $x < 250$

$100 < x < 250$

Value

Q11 $2x + y = 4$

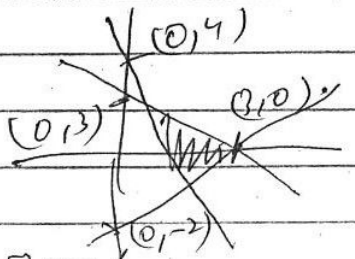
x	2	0
y	0	4

$x + y = 3$

x	3	0
y	0	3

$2x - 3y = 6$

x	3	0
y	0	-2



13 $f(1) = 1$

$f(2) = 3$

$f(0) = -1$

$f(-1) = -3$

$f(1) = 1$

$a \times 1 + b \times 1 = 1 \Rightarrow a + b = 1$

$f(2) = 3 \Rightarrow 2a + b = 3$

$f(0) = -1 \Rightarrow b = -1$

$f(-1) = -3 \Rightarrow -a + b = -3$

$a = 2, \quad b = -1$

14 $p = \frac{|-k\cos 2\theta|}{\sqrt{\cos^2\theta + \sin^2\theta}}$

$p^2 = k^2\cos^2 2\theta$ — (1)

$q = \frac{|-k|}{\sqrt{\frac{1}{\cos^2\theta} + \frac{1}{\sin^2\theta}}}$

$q^2 = \frac{k^2\sin^2 2\theta}{4}$

$p^2 + 4q^2 = k^2$.

15 $\sqrt{3}x + y + 2 = 0$

$-\sqrt{3}x - y = 2$

$-\frac{\sqrt{3}}{2}x - \frac{1}{2}y = 1$

$\cos\theta = -\frac{\sqrt{3}}{2}$, $\sin\theta = -\frac{1}{2}$, $p = 1$

$\theta = \frac{7\pi}{6}$, $p = 1$