

MISCELLANEOUS EXERCISE 3

1. $f(x) = 7x - 4$

a. $f(7) = 7(7) - 4 = 45$

$f(\frac{1}{2}) = 7(\frac{1}{2}) - 4 = -\frac{1}{2}$

$f(-5) = 7(-5) - 4 = -39$

b. $f(x) = 10$

$7x - 4 = 10$

$7x = 14$

$x = 2$

c. $f(x) = x$

$7x - 4 = x$

$7x - x = 4$

$6x = 4$

$x = \frac{4}{6} = \frac{2}{3}$

d. $f(x) = f(37)$

$7x - 4 = 7(37) - 4$

$x = 37$

2. $f(x) = f(4)$

$x^2 - 3x + 5 = 16 - 12 + 5$

$x^2 - 3x + 5 = 9$

$x^2 - 3x - 4 = 0$

$(x-4)(x+1) = 0$

$x = 4, x = -1$

6. $3x + y - 2 = 0 \Leftrightarrow y = -3x + 2$
 $y = (4x - 3)(x - 2) \Leftrightarrow y = 4x^2 - 11x + 6$

$-3x + 2 = 4x^2 - 11x + 6$

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

$4(x^2 - 2x + 1) = 0$

$4(x-1)^2 = 0$

$x = 1, y = -1 \quad (1, -1)$

9. $f(x) = ax^2 + bx + c$

$f(0) = 6 = 0 + 0 + c \Rightarrow c = 6 //$

$f(-1) = 15 = a - b + 6 \Rightarrow a - b = 9$

$f(1) = 1 = a + b + 6 \Rightarrow a + b = -5$

$2a = 4$

$a = 2$

$b = -7 //$

12. $f(x) = ax + b \quad f(-2) = 27, f(1) = 15$

$f(-2) = -2a + b = 27$

$f(1) = a + b = 15$

$-3a = 12$

$a = -4$

$b = 19$

$f(x) = -4x + 19 = -5$

$-4x = -24$

$x = \underline{6}$

13. $y = ax^2 + bx + c$

$(-4, 0) \times (9, 0)$

$y = a(x+4)(x-9)$

$120 = a(1+4)(1-9)$

$120 = a(5)(-8)$

$a = \frac{120}{-40} = -3$

$y = -3(x+4)(x-9)$

$y = -3(x^2 - 5x - 36)$

$y = -3x^2 + 15x + 108$

\therefore Cross y axis @ $(0, 108)$

$$14 \quad y = ax^2 + bx + c$$

$$(-1, 22) \quad 22 = a - b + c \quad (1)$$

$$(1, 8) \quad 8 = a + b + c \quad (2)$$

$$(3, 10) \quad 10 = 9a + 3b + c \quad (3)$$

Eliminate a & c

$$(1) - (2) \quad 14 = -2b$$

$$b = -7$$

$$(2) \quad 8 = a - 7 + c$$

$$15 = a + c \quad (A)$$

$$(3) \quad 10 = 9a - 21 + c$$

$$31 = 9a + c \quad (B)$$

Eliminate c .

$$(B) - (A) \quad 16 = 8a$$

$$a = 2 //$$

$$c = 13 //$$

$$\therefore y = 2x^2 - 7x + 13$$

$$(-2, p)$$

$$p = 2(4) - 7(-2) + 13$$

$$p = 8 + 14 + 13$$

$$p = \underline{\underline{35}}$$

$$(q_h, 17)$$

$$17 = 2q_h^2 - 7q_h + 13$$

$$2q_h^2 - 7q_h - 4 = 0$$

$$(2q_h + 1)(q_h - 4) = 0$$

$$\frac{2}{1} \times + \frac{1}{-4} \quad q_h = -\frac{1}{2}, \underline{\underline{4}}$$

$$16 \quad y = x^2 - 3x + c \quad \left. \begin{array}{l} \\ \\ \end{array} \right\} (-2, 12)$$

$$y = k - x - x^2$$

$$12 = 4 + 6 + c \quad 12 = k + 2 - 4$$

$$c = \underline{\underline{2}} \quad k = \underline{\underline{14}}$$

$$y = x^2 - 3x + 2 \quad \left\{ \begin{array}{l} x^2 - 3x + 2 = 14 - x - x^2 \\ y = 14 - x - x^2 \end{array} \right. \quad \left. \begin{array}{l} 2x^2 - 2x - 12 = 0 \\ x^2 - x - 6 = 0 \end{array} \right.$$

$$x^2 - x - 6 = 0$$

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

$$x = 3, -2$$

$$x = 3, y = 9 - 9 + 2 = 2 \quad (3, 2)$$

$$x = -2, y = 4 + 6 + 2 = 12 \quad (-2, 12)$$

$$17 \quad y = x^2 + 3x + 14 \quad \left. \begin{array}{l} \\ \\ \end{array} \right\} \quad \left. \begin{array}{l} x^2 + 3x + 14 = x^2 + 2x + 11 \\ x = -3 \\ y = 9 - 9 + 14 = 14 \end{array} \right\} (-3, 14)$$

$$y = x^2 + 2x + 11$$

$$y = px^2 + px + p \rightarrow (-3, 14)$$

$$14 = 9p - 3p + p$$

$$14 = 7p$$

$$p = \underline{\underline{2}}$$

$$18 \quad y = x - 1 \quad \left. \begin{array}{l} \\ \\ \end{array} \right\}$$

$$y = x^2 - 5x - 8$$

$$x - 1 = x^2 - 5x - 8$$

$$0 = x^2 - 6x - 7$$

$$(x-7)(x+1) = 0$$

$$x = 7, -1$$

$$x = 7, y = 7 - 1 = 6 \quad (7, 6) \quad A$$

$$x = -1, y = -1 - 1 = -2 \quad (-1, -2) \quad B$$

$$y = p + q_h x - 2x^2$$

$$A(7, 6) \quad 6 = p + 7q_h - 98 \Rightarrow 104 = p + 7q_h$$

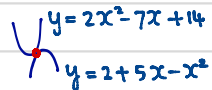
$$B(-1, -2) \quad -2 = p - q_h - 2 \Rightarrow 0 = p - q_h$$

$$104 = 8q_h$$

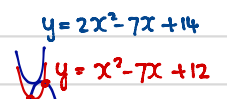
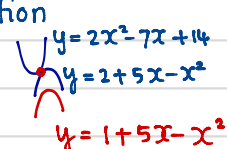
$$q_h = 13 //$$

$$p = 13 //$$

$$\begin{aligned}
 19. \quad & y = 10x - 9 \\
 & y = x^2 \\
 & 10x - 9 = x^2 \\
 & x^2 - 10x + 9 = 0 \\
 & (x-1)(x-9) = 0 \\
 & x = 1 \quad x = 9 \\
 & y = 1 \quad y = 81 \\
 & (1, 1) \quad (9, 81)
 \end{aligned}$$

$$\begin{aligned}
 23. \quad & \left. \begin{aligned} y &= 2x^2 - 7x + 14 \\ y &= 2 + 5x - x^2 \end{aligned} \right\} \\
 & 0 = 3x^2 - 12x + 12 \\
 & x^2 - 4x + 4 = 0 \\
 & (x-2)^2 = 0 \\
 & x = 2, \quad y = 8 - 14 + 14 = 8 \\
 & (2, 8)
 \end{aligned}$$


$$\begin{aligned}
 21. \quad & \left. \begin{aligned} y &= x^2 - 5x - 3 \\ y &= 3 - 5x - x^2 \end{aligned} \right\} \\
 & x^2 - 5x - 3 = 3 - 5x - x^2 \\
 & 2x^2 - 6 = 0 \\
 & 2(x^2 - 3) = 0 \\
 & 2(x + \sqrt{3})(x - \sqrt{3}) = 0 \\
 & x = -\sqrt{3}, +\sqrt{3} \\
 & y = 3 + 5\sqrt{3} - 3 = 5\sqrt{3} \quad (-\sqrt{3}, 5\sqrt{3}) \\
 & y = 3 - 5\sqrt{3} - 3 = -5\sqrt{3} \quad (\sqrt{3}, -5\sqrt{3})
 \end{aligned}$$

$$\begin{aligned}
 a. \quad & \left. \begin{aligned} y &= 2x^2 - 7x + 12 \\ y &= 2 + 5x - x^2 \end{aligned} \right\} \\
 & 2 \text{ pts of intersection} \\
 & \left. \begin{aligned} y &= 2x^2 - 7x + 14 \\ y &= 1 + 5x - x^2 \end{aligned} \right\} \\
 & \text{No intersection} \\
 c. \quad & \left. \begin{aligned} y &= 2x^2 - 7x + 34 \\ y &= 22 + 5x - x^2 \end{aligned} \right\} \\
 & 1 \text{ point of intersection}
 \end{aligned}$$



$$\begin{aligned}
 24. \quad & a \oplus 1 \\
 & b \ominus -1
 \end{aligned}$$