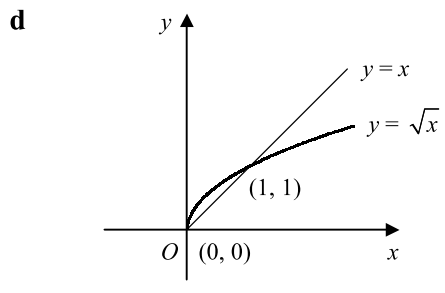
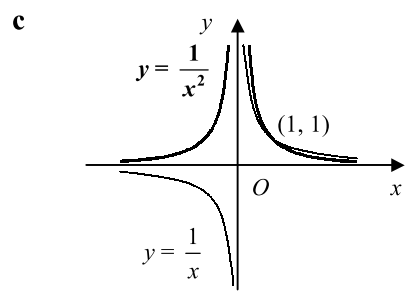
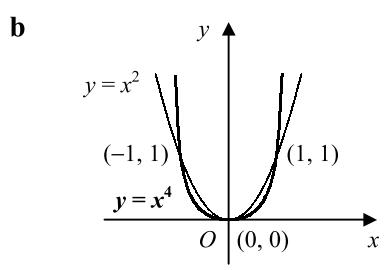
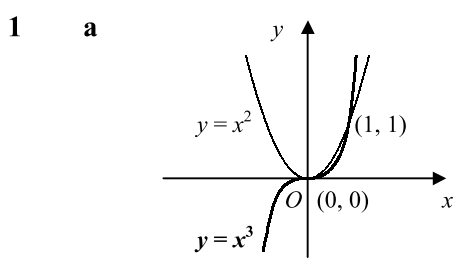
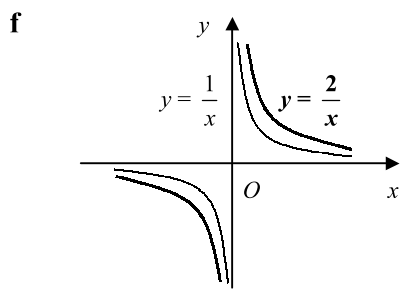
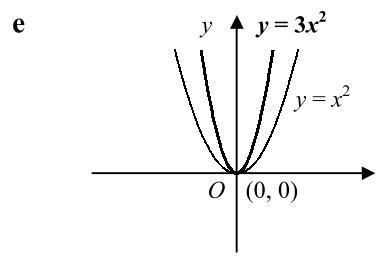


**C1** **GRAPHS OF FUNCTIONS** *Answers - Worksheet A*

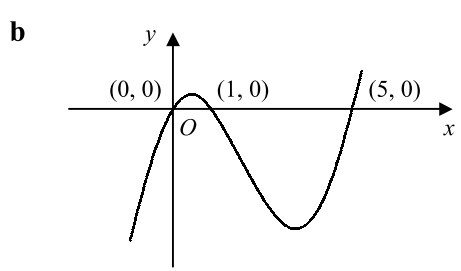
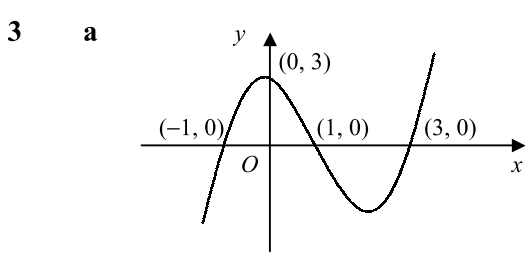
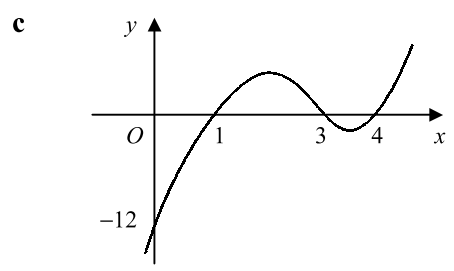


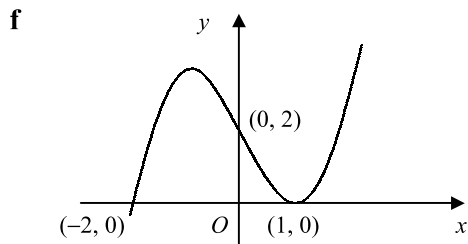
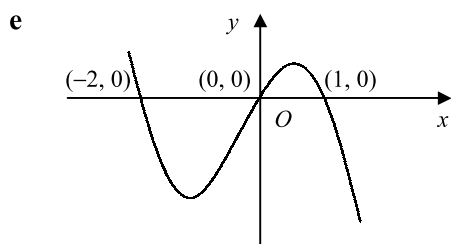
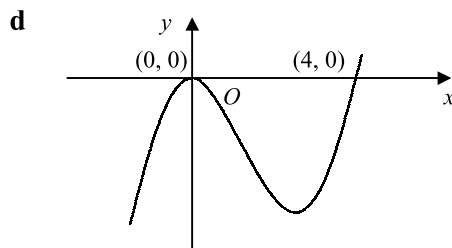
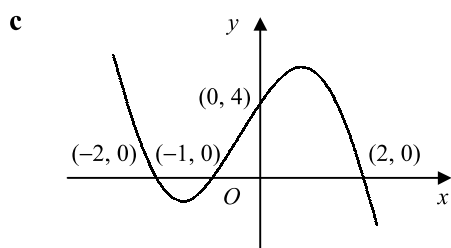
asymptotes:  $y = 0$  and  $x = 0$



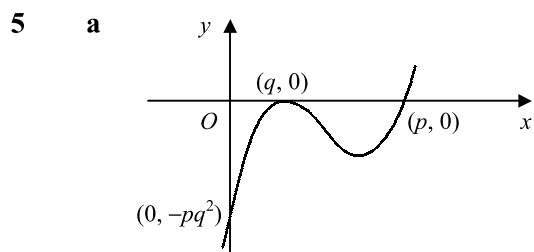
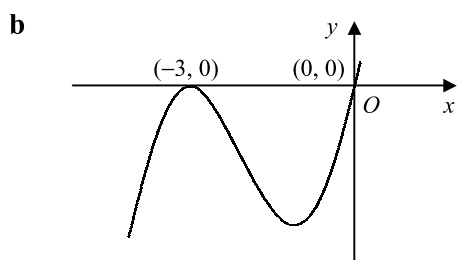
asymptotes:  $y = 0$  and  $x = 0$

- 2 a**  $= (-1) \times (-3) \times (-4) = -12$   
**b**  $x = 1, 3, 4$

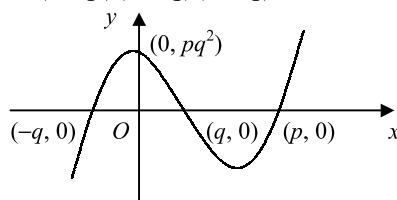




**4 a**  $= x(x^2 + 6x + 9) = x(x + 3)^2$



**b**  $y = (x - p)(x + q)(x - q)$



**6** TP at  $(1, -2)$   
 $\therefore f(x) = k(x - 1)^2 - 2$   
 crosses  $y$ -axis at  $(0, -5)$   
 $\therefore -5 = k - 2$   
 $k = -3$   
 $\therefore f(x) = -3(x - 1)^2 - 2$   
 $[ f(x) = -3x^2 + 6x - 5 ]$

**7** crosses  $x$ -axis at  $(-2, 0)$ ,  $(1, 0)$  and  $(2, 0)$   
 $\therefore y = k(x + 2)(x - 1)(x - 2)$   
 crosses  $y$ -axis at  $(0, -8)$   
 $\therefore -8 = 4k$   
 $k = -2$   
 $\therefore y = -2(x + 2)(x - 1)(x - 2)$   
 $= -2(x + 2)(x^2 - 3x + 2)$   
 $= -2(x^3 - 3x^2 + 2x + 2x^2 - 6x + 4)$   
 $= -2x^3 + 2x^2 + 8x - 8$   
 $\therefore a = -2, b = 2, c = 8, d = -8$

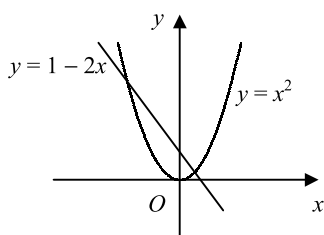
**8 a** 4

**b** 0

**c** 2

**d** 3

9 a



b 2 roots as  $x^2 + 2x - 1 = 0 \Rightarrow x^2 = 1 - 2x$  and the graphs of  $y = x^2$  and  $y = 1 - 2x$  intersect at 2 points

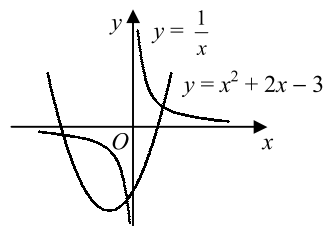
10 a  $x^2 + 2x - 3 = (x + 1)^2 - 1 - 3 = (x + 1)^2 - 4 \therefore$  turning point is  $(-1, -4)$ 

b  $x^2 + 2x - 3 - \frac{1}{x} = 0 \Rightarrow x^2 + 2x - 3 = \frac{1}{x}$

$\therefore$  roots where  $y = x^2 + 2x - 3$  and  $y = \frac{1}{x}$  intersect

graphs intersect at 1 point for  $x > 0$  and 2 points for  $x < 0$

$\therefore$  one positive and two negative real roots



11  $x - 3 = x^2 - 5x + 6$

$x^2 - 6x + 9 = 0$

$(x - 3)^2 = 0$

repeated root

$\therefore y = x - 3$  is tangent to  $y = x^2 - 5x + 6$

12 a  $x^2 + 5x + 8 = 3x + 7$

$x^2 + 2x + 1 = 0$

$(x + 1)^2 = 0$

$x = -1 \therefore x = -1, y = 4$

b repeated root

$\therefore y = 3x + 7$  is tangent to  $y = x^2 + 5x + 8$  at the point  $(-1, 4)$

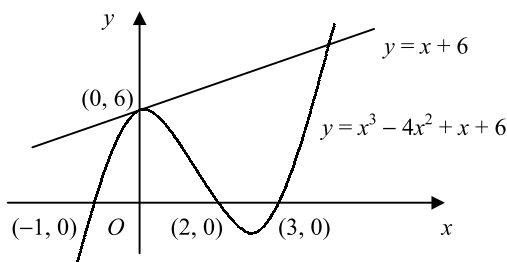
13 a  $x^3 - 4x^2 + x + 6 = x + 6$

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

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

$x = 0, 4 \therefore (0, 6)$  and  $(4, 10)$

b



14  $2x^2 - 5x + 1 = 3x + k$

$2x^2 - 8x + 1 - k = 0$

for tangent, repeated root  $\therefore b^2 - 4ac = 0$ 

$\therefore 64 - 8(1 - k) = 0$

$k = -7$

15  $x^2 + ax + 18 = 2 - 5x$

$x^2 + (a + 5)x + 16 = 0$

intersect at 2 points  $\therefore b^2 - 4ac > 0$ 

$\therefore (a + 5)^2 - 64 > 0$

$a^2 + 10a - 39 > 0$

$(a + 13)(a - 3) > 0$

$a < -13$  or  $a > 3$

16 a  $x^2 - 2x + 6 = px + p$

$x^2 - (p + 2)x + 6 - p = 0$

for tangent, repeated root  $\therefore b^2 - 4ac = 0$ 

$\therefore (p + 2)^2 - 4(6 - p) = 0$

$p^2 + 8p - 20 = 0$

$(p + 10)(p - 2) = 0$

$p = -10, 2$

b  $x^2 - 2x + 6 = qx + 7$

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

for tangent, repeated root  $\therefore b^2 - 4ac = 0$ 

$\Rightarrow (q + 2)^2 + 4 = 0$

but for real  $q, (q + 2)^2 \geq 0 \therefore$  no solutions