

## Weekly Quiz – Term 1 Week 11

1. The graphs of  $ax + by = 6$ ,  $y = \frac{c}{x} + d$  and  $y = n(x - p)^2 + q$  are shown below. Determine the values of the constants  $a, b, c, d, n, p$  and  $q$ .

[7]

Parabola

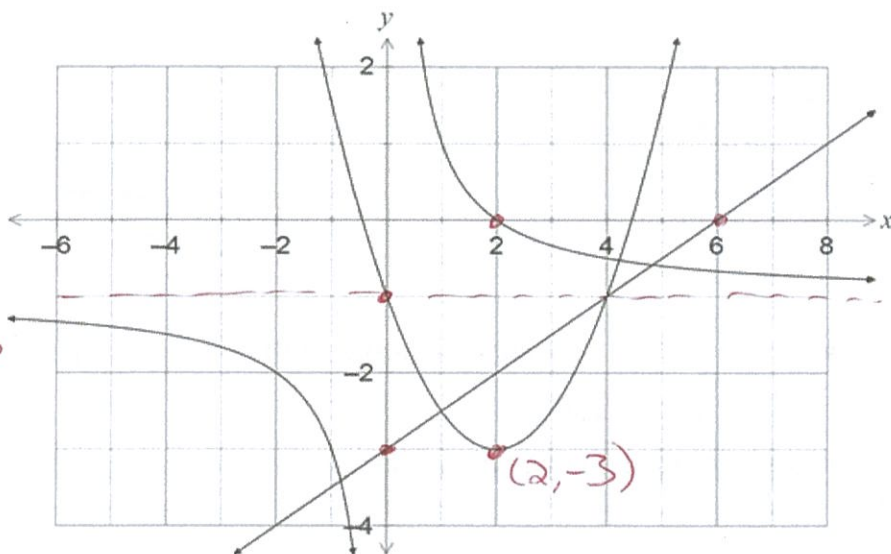
$$p = 2 \checkmark$$

$$q = -3 \checkmark$$

$$-1 = n(0 - 2)^2 - 3$$

$$= 4n - 3$$

$$n = \frac{1}{2} \checkmark$$

Linear

$$6a = 6$$

$$a = 1 \checkmark$$

$$-3b = 6$$

$$b = -2 \checkmark$$

Hyperbola

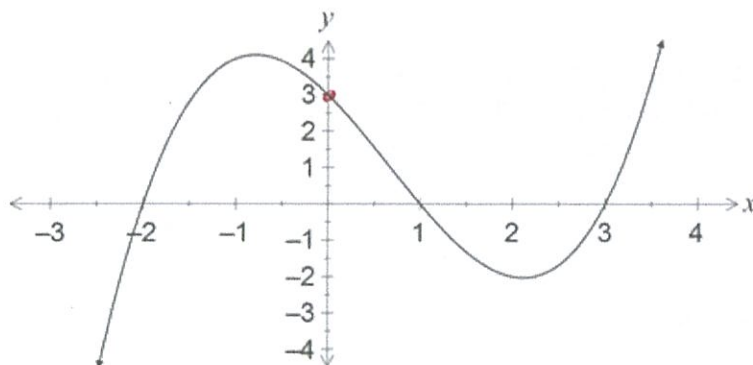
$$\text{Asymptote @ } x = -1 \therefore d = -1 \checkmark$$

$$0 = \frac{c}{2} - 1$$

$$c = 2 \checkmark$$

2. The graph of  $y = k(x - a)(x - b)(x - c)$  is shown below, where  $a, b, c$  and  $k$  are constants and  $a < b < c$ .

[4]

Determine the values of the constants  $a, b, c$  and  $k$ .

$$3 = k(2)(-1)(-3)$$

$$3 = 6k$$

$$k = \frac{1}{2} \checkmark$$

$$a = -2 \checkmark$$

$$b = 1 \checkmark$$

$$c = 3 \checkmark$$

3. (a) A function is defined by  $f(x) = (x-2)^2(x+1)$ .

[8]

- (i) Determine the coordinates of the y-intercept of the graph of  $y = f(x)$ . (1 mark)

$$f(0) = (-2)^2(1) \\ = 4 \quad (0, 4) \checkmark$$

- (ii) Expand and simplify  $f(x)$ . (2 marks)

$$f(x) = (x^2 - 4x + 4)(x+1) \\ = x^3 - 3x^2 + 4 \checkmark$$

- (iii) The coordinates of one of the turning points of the graph of  $y = f(x)$  can be read from the function definition. State the coordinates of this turning point. (1 mark)

$$(2, 0)$$

- (b) Consider the function  $g(x) = x^3 - 3x^2 - 10x + 24$ .

- (i) Determine  $g(2)$ . (1 mark)

$$g(2) = 2^3 - 3(2)^2 - 10(2) + 24 \\ = 0 \checkmark$$

- (ii) Factorise  $g(x)$ . (3 marks)

$$g(x) = (x-2)(x^2 + ax - 12) \checkmark$$

$$a - 2 = -3$$

$$a = -1$$

$$g(x) = (x-2)(x^2 - x - 12) \checkmark \\ = (x-2)(x-4)(x+3) \checkmark$$