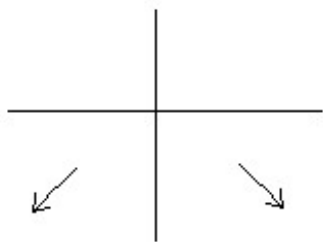


## Quiz 9

1. Sketch a graph of the polynomial  $f(x) = -3x^2 - 2x + 1$  by (i) finding the left and right-hand behavior of the function, (ii) finding the zeroes of the function, and (iii) finding the  $y$ -intercept. (Make sure you explicitly show the work needed for parts (i), (ii), and (iii)).

(i)  $n = 2$  (even),  $a = -3$  ( $< 0$ ).



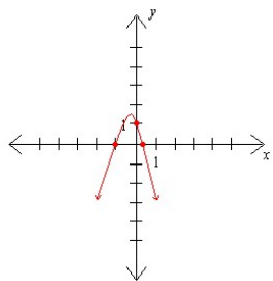
(ii)  $-3x^2 - 2x + 1 = 0$

$$3x^2 + 2x - 1 = 0$$

$$(3x - 1)(x + 1) = 0$$

$$x = \frac{1}{3}, x = -1$$

(iii)  $f(0) = 1$



2. Let  $f(x) = x^3 - x$  and  $g(x) = 2x + 4$ .

(a) Find  $(g \circ f)(x)$ .

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

(b) Find  $(f \circ g)(x)$ .

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

(c) Find  $(g \circ f)(2)$ .

$$2(2)^3 - 2(2) + 4 = 16$$

3. Use long division to divide  $(x^4 + 4x^3 - 3x - 12) \div (x^2 - 3)$ . Make sure to clearly express your result in the form  $quotient + \frac{remainder}{divisor}$ .

$$\begin{array}{r} x^2 + 4x + 3 \\ x^2 - 3 \overline{)x^4 + 4x^3 - 3x - 12} \\ \underline{x^4 - 3x^2} \phantom{- 12} \\ 4x^3 + 3x^2 - 3x - 12 \\ \underline{4x^3 - 12x} \phantom{- 12} \\ 3x^2 + 9x - 12 \\ \underline{3x^2 - 9} \phantom{- 12} \\ 9x - 3 \end{array}$$

Thus,  $\frac{x^4 + 4x^3 - 3x - 12}{x^2 - 3} = x^2 + 4x + 3 + \frac{9x - 3}{x^2 - 3}$