

(1) Factor the following polynomials.

(a)  $P(x) = x^3 - 3x^2 - 18x$

$$x(x^2 - 3x - 18) = x(x-6)(x+3)$$

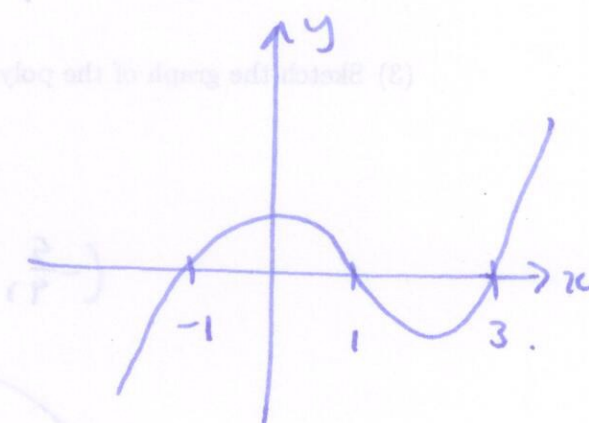
(b)  $P(x) = x^4 + 4x^3 - 12x^2$

$$x^4 + 4x^3 - 12x^2 = x^2(x^2 + 4x - 12) = x^2(x+6)(x-2)$$

(2) Sketch the graph of the polynomial  $P(x) = (x+1)(x-1)2(x-3)$  using end behaviour and roots.

$x+1$	-	+	+	+
$x-1$	-	-	+	+
$x-3$	-	-	-	+
	-	+	-	+

leading term  $x^3$ :



Consider the polynomial  $f(x) = -5x + 3 - 2x^2$ .

(1) Complete the square, so the polynomial looks like  $a(x+h)^2 + k$  as follows:

(a) Re-order the terms.

$$(-2x^2 - 5x + 3)$$

(b) Factor out the leading coefficient.

$$-2 \left( x^2 + \frac{5}{2}x - \frac{3}{2} \right)$$

(c) Work out the constant term inside the bracket in the  $(x-h)^2$  part.

$$-2 \left( \left( x + \frac{5}{4} \right)^2 + ? \right)$$

(d) Work out the constant term  $+k$  outside the bracket.

$$-2 \left( x^2 + \frac{5}{2}x + \frac{25}{16} - \frac{25}{16} - \frac{3}{2} \right) = -2 \left( \left( x + \frac{5}{4} \right)^2 - \frac{49}{16} \right)$$

(2) Can you factor the polynomial?

$$-(2x - 1)(x + 3)$$

$$= -2 \left( x + \frac{5}{4} \right)^2 + \frac{49}{8}$$

(3) Sketch the graph of the polynomial.

