Single Pure – Polynomial Factorising & Sketching

Using the techniques found yesterday (i.e. spotting a solution and then using this to state a factor) answer the following questions:

[Anyone forgetting the three stage process for factorising will have their arms pulled off.]

1. (a) Factorise fully $x^3 - 4x^2 + x + 6$. $(x-2)(x+1)(x-3)$
   (b) Hence solve $0 = x^3 - 4x^2 + x + 6$. $x = 2$ or $x = -1$ or $x = 3$
   (c) Sketch the graph of $y = x^3 - 4x^2 + x + 6$.

2. (a) Factorise fully $2x^3 - x^2 - 13x - 6$. $(x-3)(x+2)(2x+1)$
   (b) Hence solve $0 = 2x^3 - x^2 - 13x - 6$. $x = 3$ or $x = -2$ or $x = -\frac{1}{2}$
   (c) Sketch the graph of $y = 2x^3 - x^2 - 13x - 6$.

3. (a) Factorise fully $4x^3 - 12x^2 + 5x + 6$. $(x-2)(2x-3)(2x+1)$
   (b) Hence solve $0 = 4x^3 - 12x^2 + 5x + 6$. $x = 2$ or $x = \frac{3}{2}$ or $x = -\frac{1}{2}$
   (c) Sketch the graph of $y = 4x^3 - 12x^2 + 5x + 6$.

4. (a) Factorise fully $4x^3 - 16x^2 + 13x - 3$. $(x-3)(2x-1)^2$
   (b) Hence solve $0 = 4x^3 - 16x^2 + 13x - 3$. $x = 3$ or $x = \frac{1}{2}$ (repeated)
   (c) Sketch the graph of $y = 4x^3 - 16x^2 + 13x - 3$.

5. (a) Factorise fully $2x^4 - x^3 - 5x^2 - 2x$. $x(x+1)(2x+1)(x-2)$
   (b) Hence solve $0 = 2x^4 - x^3 - 5x^2 - 2x$. $x = 0$ or $x = -1$ or $x = -\frac{1}{2}$ or $x = 2$
   (c) Sketch the graph of $y = 2x^4 - x^3 - 5x^2 - 2x$.

6. (a) Factorise fully $x^4 + 2x^3 - 13x^2 - 14x + 24$. $(x-1)(x+2)(x-3)(x+4)$
   (b) Hence solve $0 = x^4 + 2x^3 - 13x^2 - 14x + 24$. $x = 1$ or $x = -2$ or $x = 3$ or $x = -4$
   (c) Sketch the graph of $y = x^4 + 2x^3 - 13x^2 - 14x + 24$.