Core 1 – Polynomial Functions

Challenge 1

The cubic polynomial $x^3 + ax^2 + bx + 4$, where a and b are constants, has factors $x - 2$ and $x + 1$. Use the factor theorem to find the values of a and b.   *(6 marks)*

Challenge 2

Given that $f(x) = x^3 - 4x^2 - x + 4$,

(a)   find $f(1)$ and $f(2)$,   (*2 marks*)

(b)   factorise $f(x)$ into the product of three linear factors.   (*3 marks*)

Challenge 3

The polynomial $f(x)$ is given by

$$f(x) = x^3 + px^2 + x + 54,$$

where p is a real number. When $f(x)$ is divided by $x + 3$, the remainder is -3.

Use the Remainder Theorem to find the value of p. *(3 marks)*

Final Challenge

$$f(x) = 6x^3 + ax^2 + bx - 5$$

where a and b are constants.

When f(x) is divided by $(x + 1)$ there is no remainder.

When f(x) is divided by $(2x - 1)$ the remainder is -15

(a) Find the value of a and the value of b.

(5)

(b) Factorise f(x) completely.

(4)