

7.3) The factor theorem

Worked example

Show that $(x - 3)$ is a factor of
 $x^3 - 2x^2 - 5x + 6$

Your turn

Show that $(x - 2)$ is a factor of
 $x^3 + x^2 - 4x - 4$

Shown
(e.g. algebraic division or factor
theorem)

Worked example

Fully factorise $3x^3 + x^2 - 12x - 4$

Your turn

Fully factorise $2x^3 + x^2 - 18x - 9$

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

Worked example

Given that $x + 2$ is a factor of $3x^4 - 4x^2 + a$, find the value of a .

Your turn

Given that $x + 1$ is a factor of $4x^4 - 3x^2 + a$, find the value of a .

$$a = -1$$

Worked example

Given that $3x + 1$ is a factor of $12x^3 + ax^2 + 2$, find the value of a .

Your turn

Given that $2x + 1$ is a factor of $6x^3 + ax^2 + 1$, find the value of a .

$$a = -1$$

Worked example

Given that $2x - 1$ is a factor of $2x^3 + 3x^2 + ax + 11$, find the value of a .

Your turn

Given that $3x - 1$ is a factor of $3x^3 + 11x^2 + ax + 1$, find the value of a .

$$a = -7$$

Worked example

Show that $(x - 2)$ is a factor of

$$5x^4 - 16x^3 - 47x^2 + 130x - 24$$

and hence find all the real solutions to

$$5x^4 - 16x^3 - 47x^2 + 130x - 24 = 0$$

Your turn

Show that $(x - 3)$ is a factor of

$$4x^4 + 15x^3 - 48x^2 - 109x + 30$$

and hence find all the real solutions to

$$4x^4 + 15x^3 - 48x^2 - 109x + 30 = 0$$

$$x = -5, x = -2, x = \frac{1}{3}, x = 3$$