

**01** The polynomial  $f(x)$  has roots of equations  $3, -3, -k$ . Given that the coefficient of  $x^3$  is  $2$ , and that  $f(x)$  has a remainder of  $8$  when divided by  $x + 1$ , find the value of  $k$ . Hence, or otherwise, find the remainder when  $f(x)$  is divided by  $x - 10$ .

Your solution here:

**02** The cubic polynomial  $f(x)$  is such that  $(x + 1)$ ,  $(x - 2)$ ,  $(x + k)$  are factors of  $f(x)$  and the coefficient of  $x^3$  is  $-2$ . Given that  $f(x)$  has a remainder of 20 when divided by  $x - 4$ , find  $k$  for  $\{k : k \neq 0, k < 1\}$ . Hence or otherwise, solve  $f(x) = 0$ .

Your solution here:

**03**

Find the x-coordinates of the points of intersection of the curve

$y = 2x^2 + 1$  and  $y = 5x - \frac{2}{x}$ . Hence, solve the equation  $\frac{t^2 + 2}{t^3} = \frac{5 - 2t^2}{t^2}$ .

Your solution here:

**04**

If  $x^2 = y + z$ ,  $y^2 = z + x$  and  $z^2 = x + y$ , find the value of

$$\left( \frac{1}{x+1} + \frac{1}{y+1} + \frac{1}{z+1} \right).$$

Your solution here: