

## IAL Activity 2

### Issues from P2

Proof in P2 has already been considered in a previous activity.

Which sections of the specification do students need to know to do the question?

Is the question suitable (with rigorous wording etc) for a written examination.

Is the question better suited to classroom use.

Avoid this question!

**1.** Draw a sketch of the curve with equation  $y = 4x^3 - 16x^2 + 19x - 6$

Write on the sketch the coordinates of the points at which the curve cuts the axes.

**2**  $P(x) = 6x^3 + ax^2 + bx - 2$

When  $P(x)$  is divided by  $(x + 2)$  the remainder is  $-140$

$(2x - 1)$  is a factor of  $P(x)$

Can  $P$  be written as the product of three factors of the form  $px + q$  where  $p$  and  $q$  are real?

**3**  $P(x)$  is a cubic polynomial with the property that all the coefficients are integers with the term independent of  $x$  being  $d$ .

Given that  $(x - n)$  is a factor of  $P(x)$ , with  $n \in \mathbb{N}$ , prove that  $d$  is a multiple of  $n$ .

**4** Find, using calculus, the area of the finite region **R** above the  $x$ -axis bounded by the curves with equations

$$y = x^3 + 1 \quad \text{and} \quad y = 5 + 4x - x^2$$

**(6 marks)**

**5** A sequence  $S$  is defined by  $u_{n+1} = a + b u_n$  where  $a$  and  $b$  are real numbers

(i) Show that for  $S$  to have period 2,  $b$  must be  $\pm 1$  and find  $a$  in each case.

(ii) Show that it is not possible for  $S$  to have period 3.

**6** A sequence  $S$  is defined by  $x_{n+1} = 2 + \frac{3}{x_n - 2}$  ( $x_n \neq 2$ )

(a) Suppose the first term of  $S$  is 5. Show that  $S$  is a periodic sequence

(b) Show, that in general,  $S$  is a periodic sequence of period 2