Exercise 3

Paper 2 style · Graphic display calculator

3 6 marks SL 2.3 · 2.4 ●●○ Typical

Let $f(x) = x^3 - 5x + 1$, for $-3 \leq x \leq 3$.

(a) Find the zeros of f. **[3]**

(b) Find the range of f. **[3]**

The markscheme is on the next page: try the question first. Written and verified by a practising IB mathematics teacher, produced with AI assistance; solved twice and recomputed by software. Not affiliated with or endorsed by the International Baccalaureate Organization.
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(b) Find the range of f. **[3]**

MARKSCHEME (a)

$x = -2.33 \ \ (-2.33005\ldots)$ **A1**

$x = 0.202 \ \ (0.201639\ldots)$ **A1**

$x = 2.13 \ \ (2.12841\ldots)$ **A1**

Total 3 marks

MARKSCHEME (b)

local maximum $(-1.29,\ 5.30)$, local minimum $(1.29,\ -3.30)$ **(M1)**

$f(-3) = -11,\ f(3) = 13$ **(A1)**

$-11 \leq f(x) \leq 13$ **A1**

Total 3 marks

Note Here the ends of the domain give the least and greatest values, not the local extrema. Award A0 for $-3.30 \leq f(x) \leq 5.30$.