Marked example 3

Paper 2 style · Graphic display calculator

3 5 marks SL 5.7 · 5.8 ●●○ Typical

The derivative of a function f is given by $f'(x) = x\cos x$, for $0 \leq x \leq 5$, where x is in radians.

(a) Find $f''(x)$. **[2]**

(b) Find the x-coordinates of the points of inflexion of the graph of f. **[2]**

(c) Write down the interval on which the graph of f is concave-down. **[1]**

MARKSCHEME (a)

attempt to use the product rule **(M1)**

$f''(x) = \cos x - x\sin x$ **A1**

Total 2 marks

MARKSCHEME (b)

$f''(x) = 0$ (and f'' changes sign) **(M1)**

$x = 0.860\ \ (0.860334\ldots),\ x = 3.43\ \ (3.42562\ldots)$ **A1**

Total 2 marks

Note Both values are needed for A1.

MARKSCHEME (c)

$0.860 < x < 3.43$ **A1**

Total 1 mark

Note FT from their values in (b). Accept non-strict inequalities.

ON THE CALCULATOR

NumWorks Radians. Functions: $f(x) = \cos(x) - x\sin(x)$; Axes: x from 0 to 5. Graph → Calculate → Find → Zeros → 0.8603336, then → → 3.425618.

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