Geometrical applications of differentiation

Points of inflexion (1)

QUESTION **1** Complete:

a At a point of inflexion a curve changes _____ .

b At a point of inflexion _____ = 0 and _____

_____ .

c A point of inflexion is a horizontal point of inflexion only if _____ = 0

QUESTION **2** Find the point of inflexion of the curve:

a $y = x^3 + 6x^2 - 7x$

b $y = x^5 - 10x^2$

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Points of inflexion (2)

QUESTION **1** Find any points of inflexion of the curve:

a $y = x^4 - 24x^2 + 8x + 5$

b $y = 3 - x^4$

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Absolute maxima and minima

QUESTION **1** Determine whether each statement is true or false.

a An absolute maximum is the greatest value of the function over the given domain. _____

b An absolute minimum must be a minimum turning point. _____

QUESTION **2** Consider the function

$f(x) = x^4 - 4x + 7$

a Find the value of the function when $x = 3$

b Find the value of the function when $x = -3$

c Find and determine the nature of any stationary points of the function.

d Determine the range of $y = f(x)$, $-3 \leq x \leq 3$

QUESTION **3** Find the greatest and least values of $y = x^3 - 3x^2 - 9x + 13$ over the interval $-2 \leq x \leq 2$

Page 12 1 a concavity b $\frac{d^2y}{dx^2}$, $\frac{d^2y}{dx^2}$ has a different sign either side of the point c $\frac{dy}{dx}$ 2 a (−2, 30) b (1, −9)

Page 13 1 a (−2, −91) and (2, −59) b no points of inflexion

Page 14 1 a true b false 2 a 76 b 100 c minimum at (1, 4) d $4 \leq y \leq 100$ 3 greatest value is 18 (when $x = -1$) and least value −9 (when $x = 2$)