MAT2-121 Calculus of a Single Variable

Quiz 2 October 3, 2014 solution

name

You must show your work/justify your answers for full credit on this quiz. 16 pts. possible

1. (6 pts.) Let f be the function whose derivative f′ is given by the rule: $f'(x) = (x+2)(x-3)$

a. On which intervals, if any, is f increasing?

$(-\infty, -2) \cup (3, \infty)$ $f' > 0$

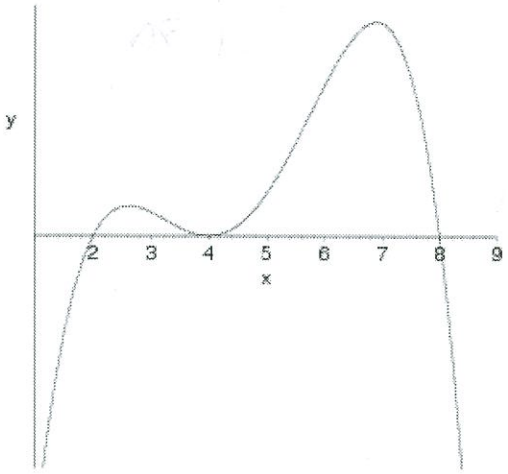
b. At which values of x, if any, does f have a stationary point?

$x = -2$ $x = 3$

c. At which values of x, if any, does f have a local minimum point?

$x = 3$ 1st der test $- \; 0 \; +$

2. (6 pts.) The graph of a second derivative of a function g whose domain in (0,9) is shown to the right. Use this graph to answer questions about g and g′.



a. Where does g have points of inflection?

2, 8 g'' changes sign

b. On what interval(s) is g concave down?

$(0,2) \cup (8,9)$ $g'' < 0$

c. On what interval(s) is g′ increasing?

$(2,8)$ $g'' > 0$

3. (4 pts.) Use the definition of a derivative as a limit of a difference quotient to find f′(4) where $f(x) = 3x^2$.

$$f'(4) = \lim_{h \to 0} \frac{f(4+h) - f(4)}{h}$$

$$= \lim_{h \to 0} \frac{3(4+h)^2 - 3 \cdot 4^2}{h}$$

$$= \lim_{h \to 0} \frac{48 + 24h + 3h^2 - 48}{h}$$

$$= \lim_{h \to 0} \frac{24h + 3h^2}{h} = \lim_{h \to 0} 24 + 3h$$

$$= 24$$