

Solutions

Math 19: Quiz 6

Name: _____

For full credit you must show your work. Partial credit may be given for incorrect solutions if sufficient work is shown.

For the function $f(x) = 2x^3 + 3x^2 - 36x + 5$, find

1. the critical numbers of f (4 pts)

$$f'(x) = 6x^2 + 6x - 36$$

$$f'(x) = 0 \Rightarrow 6x^2 + 6x - 36 = 0 \Rightarrow 6(x^2 + x - 6) = 0$$

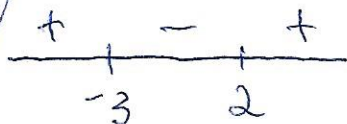
$$\Rightarrow x^2 + x - 6 = 0$$

$$\Rightarrow (x+3)(x-2) = 0$$

$$\Rightarrow \boxed{x = -3, x = 2}$$

2. the intervals where f is increasing/decreasing (3 pts)

increasing:
 $(-\infty, -3) \cup (2, \infty)$
decreasing:
 $(-3, 2)$



$$f'(-4) = 6(-4)^2 + 6(-4) - 36 = 36 > 0$$

$$f'(0) = -36 < 0$$

$$f'(3) = 6(3)^2 + 6(3) - 36 = 36 > 0$$

3. the local maximum(s) and local minimum(s) (3 pts)

$$x = -3 \quad \text{local max}$$

$$x = 2 \quad \text{local min}$$

Bonus: The vertex of a parabola

$$f(x) = ax^2 + bx + c$$

is the same as the local extremum. Find the vertex using the method you used in the previous problem. Your answer should involve some of the numbers a, b, c . (2 pts)

$$f'(x) = 2ax + b$$

$$f'(x) = 0 \Rightarrow 2ax + b = 0$$

$$\Rightarrow 2ax = -b$$

$$\Rightarrow \boxed{x = \frac{-b}{2a}}$$