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)

$x = -3$ local max

$x = 2$ 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)

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

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

$\Rightarrow 2ax = -b$

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