Math 157 - Quiz 8

October 29, 2014

Name key

Score _____

Show all work to receive full credit. Supply explanations when necessary.

1. (3 points) Use the 2nd derivative to determine whether the graph of

$$f(x) = 85x^4 + 107x^3 - 264x^2 + 120x + 1$$

is concave up or concave down at $x = -1$.

$f''(x) = 3(4)(85)x^2 + 2(3)(107)x - (1)(2)(264)$

$= 1020x^2 + 642x - 528$

$f''(-1) = 1020 - 642 - 528 = -150 \Rightarrow$ GRAPH IS CONCAVE DOWN.

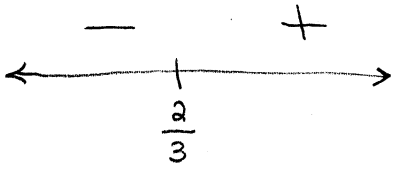
2. (4 points) Find the inflection point(s) of the graph of $y = x\,e^{-3x}$.

$\frac{dy}{dx} = e^{-3x} - 3xe^{-3x} = e^{-3x}(1-3x)$

$\frac{d^2y}{dx^2} = -3e^{-3x}(1-3x) - 3e^{-3x}$

$= e^{-3x}(-6+9x) = 0 \Rightarrow x = \frac{6}{9} = \frac{2}{3}$

SIGNS OF y''



$\left(\frac{2}{3}, \frac{2}{3}e^{-2}\right)$ IS THE ONLY INF. PT.

3. (3 points) Find the critical numbers and determine whether they give local (relative) minima or maxima: $g(x) = 2x^3 - 3x^2 - 36x$.

$g'(x) = 6x^2 - 6x - 36$

$= 6(x^2 - x - 6)$

$= 6(x-3)(x+2) = 0$

$\Rightarrow x = 3,\ x = -2$

SIGNS OF $g'(x)$

$g(-2) = 44$ IS A REL. MAX

$g(3) = -81$ IS A REL. MIN.