Name: _____ Date:_____ Period: _____

Mid-Unit 5 Review – Analytical Applications of Differentiation

Lessons 5.1 through 5.7

Reviews do NOT cover all material from the lessons but will hopefully remind you of key points. To be prepared, you must study all packets from Unit 5.

1. If $y = -2x^2 + 4x + 3$ apply the Mean Value Theorem to find when the instantaneous rate of change will equal the average rate of change on the interval $[1, 3]$.

2. Below is the graph of f'. Find all relative extrema of f and justify.

$f'(x)$
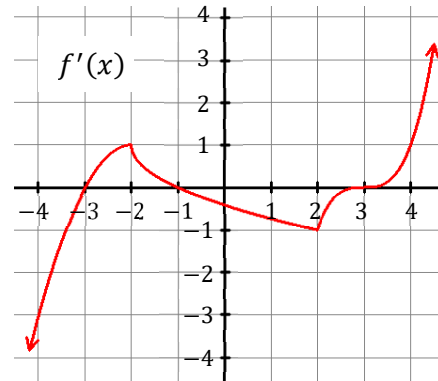
3. The derivative of g is given by $g'(x) = 6x^2 - 6$. Find all relative extrema and justify your conclusions.

4. What is the minimum value of $f(x) = xe^{\frac{x}{3}}$?

5. **Calculator active problem.** The derivative of f is defined by $f'(x) = \sin(x - x^2)$ for $0 \le x \le 3$. On what interval(s) is f decreasing?

6. What is the absolute maximum value AND the absolute minimum value of the function $g(x) = x^3 - 12x$ on the closed interval $[0, 4]$.

7. Use the 2nd Derivative Test to find x-values of the extrema of $g(x) = 2\cos x - x$ on the interval $(0, 2\pi)$ and justify your answer.

8. Find the intervals of concavity for the function $f(x) = x^4 + 4x^3 - 18x^2 - 4x + 7$