Unit 5 - Mid-Unit Review

Calc. AB

Warmup: Questions from Lesson 5.7?

If you haven’t finished the CA worksheet from yesterday take it out and continue to work on it during this time.

Name: ______________________________ Date:______________ Period: _____

Review

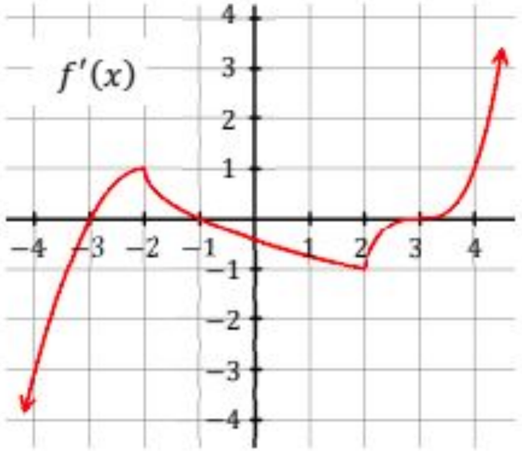
Mid-Unit 5 Review – Analytical Applications of Differentiation

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.



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 $f(x) = x^4 + 4x^3 - 18x^2 - 4x + 7$

Notes Filled In:

AP Calc. AB/BC - Mid-Unit Review - Filled In

Practice - Test Prep.

Take the next 5-10 minutes to work together on the practice - test prep section of our notes.

We will go through it together on the board after the time is up!

Name: ______________________________ Date:_______________ **Corrective Assignment**

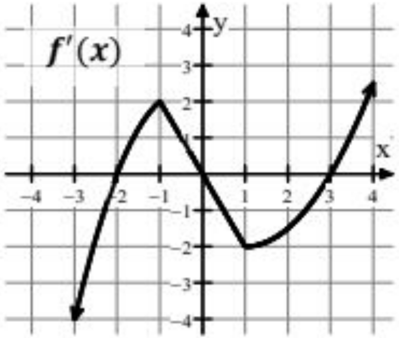
Mid-Unit 5 CA – Analytical Applications of Differentiation

1. Apply the Mean Value Theorem to $y = x^3 - 2x^2 - 3$ to find when the instantaneous rate of change will equal the average rate of change on the interval $[0, 2]$

2. **Calculator active problem.** The first derivative of the function f is given by $f'(x) = \frac{\cos^2 x}{x} - \frac{1}{5}$. How many critical values does f have on the open interval $(0, 10)$?

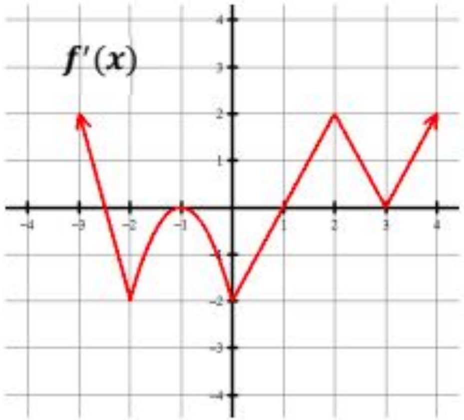
(A) One (B) Three (C) Four (D) Five (E) Seven

3. The graph shows the derivative of f, f'. Identify the intervals when f is increasing and decreasing. Include a justification statement.



Increasing: Decreasing:

4. The graph of f', the derivative of f, is shown. Find the x-value of each relative maximum and minimum.



Relative Maximum(s) at

Relative Minimum(s) at

5. Use the First Derivative Test to help you find the relative minimum value of $f(x) = x \ln x$. What is this value?

6. What is the absolute maximum value of the function $g(x) = 2x^3 + \frac{3}{2}x^2 - 3x - 10$ on the closed interval $[-2, 2]$.

7. Use the 2nd Derivative Test to find the x-value(s) of all relative extrema of the function $f(x) = 2\sin x + \sqrt{2}x$ on the interval $[0, 2\pi]$. Justify your answer.

8. **Calculator active problem.** A local wild boar population is changing at a rate modeled by

$$b(t) = 0.04t^4 - 0.25t^2 - 0.02t$$

boar per year where t is measured in years. Is the boar population growing or shrinking at time $t = 3$ years? Justify your answer.

9. **Calculator active problem.** The derivative of g is given by $g'(x) = \cos(4x^2)$ for $0 \leq x \leq 1.5$. On what interval(s) is g decreasing?

10. **Calculator active problem.** The function f has first derivative given by $f'(x) = \sqrt{x} - \frac{e^x}{x}$. What is the x-coordinate of the inflection point of the graph of f?

ANSWERS to Mid-Unit 5 Corrective Assignment

1. $\frac{4}{3}$	2. B. Three	3. Increasing: $(-2, 0)$ and $(3, \infty)$ because $f'(x) > 0$. Decreasing: $(\infty, -2)$ and $(0, 3)$ because $f'(x) < 0$.	4. Max at $x = -2.5$ Min at $x = 1$
5. $f(e^{-1}) = -\frac{1}{e}$ Min value is $-\frac{1}{e}$.	6. $g(-2) = -14$ $g(-1) = -7.5$ $g\left(\frac{1}{2}\right) = -10.875$ $g(2) = 6$ Absolute maximum value of 6.	7. Rel max at $x = \frac{3\pi}{4}$ because $f'\left(\frac{3\pi}{4}\right) = 0$ and $f''\left(\frac{3\pi}{4}\right) < 0$. Rel min at $x = \frac{5\pi}{4}$ because $f'\left(\frac{5\pi}{4}\right) = 0$ and $f''\left(\frac{5\pi}{4}\right) > 0$.	
8. $b(3) = 0.93$. $b(t)$ is the rate of change, therefore the population is increasing because $b(3) > 0$.	9. $0.6266 < x < 1.085$ and $1.401 < x < 1.5$	10. $x = 1.1978$	