

AP Calculus AB Review for Chapter 4

1. Find the value of c guaranteed by the MVT for $f(x) = \sin x$ on the interval $[4, 5]$... WITH CALCULATOR

2. Find the value of c guaranteed by the MVT for $f(x) = 4x^2 + 5x$ on the interval $[2, 1]$

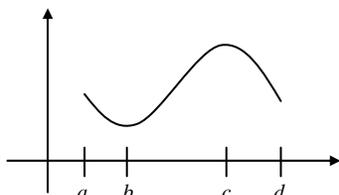
3. Given $y = x^3 - 3x$, find the following about the function AND sketch a graph.

- zero(s)
- intervals where the function is increasing/decreasing
- Maximum/Minimums
- intervals where the function is Concave Up/Concave Down/Points of Inflection

4. If $y'' = x^3 - 4x^2$, where is the function concave up, concave down, point of inflection?

5. What are the signs of $g'(x)$, $g''(x)$ at each point.

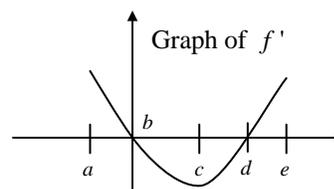
Explain your reasoning.



6. Given the graph of f' , when is the function

increasing, decreasing, concave up, and concave down?

Where does the function have a maximum? Where does the function have a minimum? Justify your responses.



7. Where do extrema occur? How do you determine whether or not the extrema is a maximum or minimum? What's the difference between absolute and relative extrema?

8. Find the maximum area of a rectangle inscribed under the curve $h(x) = \sqrt{25 - x^2}$

9. If the derivative of the function is given by $g'(x) = 2\cos\left(x - \frac{\pi}{6}\right) + 1$ on $[-2\pi, 2\pi]$, when is y increasing, decreasing, concave up, concave down? Where is the maximum(s), minimum(s), and point(s) of inflection? Use your calculator and the graph of the derivative to justify your responses to ALL answers.

10. If $f(x) = 4x^2 - 4x - 11$,

- find the linearization $L(x)$ at $x = -3$, and
- use $L(x)$ to approximate $f(-3.002)$.

11. Let $y = \ln(6x + 7)$.

- Find dy and
- estimate dy for $x = 8$ and $dx = 0.04$.

12. Use differentials to estimate the value of $f(17.99)$ where $f(x) = \sqrt{x - 2}$.

13. Use Newton's method to estimate all real solutions of the equation $2x^4 - 3x^2 - 7x + 1 = 0$. Make the answers accurate to 7 decimal places.

14. One airplane is approaching an airport from the north at 181 km/hr. A second airplane approaches from the east at 191 km/hr. Find the rate at which the distance between the planes changes when the southbound plane is 34 km away from the airport and the westbound plane is 21 km from the airport.

15. A container in the shape of an inverted right circular cone has a radius of 2.00 inches at the top and a height of 6.00 inches. At the instant when the water in the container is 3.00 inches deep, the surface level is falling at the rate of -0.900 in./s. Find the rate at which water is being drained.