Name_____ **#2 MVT, Rolle's, Extrema, and More!**

1. Determine the critical points(s) for $g(x) = \sqrt{1 - x^2}$.

2. Find the absolute extrema values for $h(x) = \dfrac{10}{x^2 + 1}$ for [-1, 2].

3. Verify that Rolle's Theorem does or does not apply to $f(x) = 1 - x^{2/3}$ for [-1, 1]. If it does apply, find c.

4. Let f be the function defined by $f(x) = x^3 - x^2 - 2x$. What is the value of c for which the instantaneous rate of change of f at $x = c$ is the same as the average rate of change of f over [-1, 1].

5. For $y = 3\ln(2x^3)$, find y'.

6. Water is flowing out at the rate of 6 m^3/min from a reservoir in the shape of a hemispherical bowl with radius 13 m. Given that the volume of water in a hemispherical bowl of radius R is $V = \dfrac{\pi}{3} y^2(3R - y)$ when the water is y units deep, how fast is the water level falling when the water is 8 m deep?

7. Let f be a differentiable functions with the following values given.

x	1	2	3	4	5
$f(x)$	-4	-1	1	6	13
$f'(x)$	3	4	2	5	6

Explain why there must be a value r with $3 < r < 5$ for which $f(r) = 10$.

Explain why there must be a value t with $3 < t < 5$ for which $f'(t) = 6$.

8. Determine whether Rolle's Theorem is valid for $f(x) = 3 - |x - 2|$ on [-1, 5]. If so, find c. If not, tell why.

9. p. 274 #3

10. p. 274 #8

11. p. 274 #11