

MTH 1125 - Test 2 (2pm Class)

FALL 2022

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Name _____

Instructions. Show CLEARLY how you arrive at your answers.

1. Compute: $\frac{d}{dx} [3x^6 + 4x^4 + 5x^3 + 7x^2 + 12x + 20\sqrt{x} + 10] =$

2. Compute: $\frac{d}{dx} [(\sin(x) + \cos(x))(3x^2 + 6x)] =$

3. Compute: $\frac{d}{dx} \left[\frac{5x^4 + 6x^3 + 16x}{3x^2 + 6x} \right] =$

4. Compute: $\frac{d}{dx} [(2x^3 + 3x^2 + 6x)^8] =$

5. Given that $f(x) = 3x^2 + 3x - 3$, give the *equation* of the line tangent to the graph of $f(x)$ at the point $(1, 3)$.

6. Given that $w = \cot(z)$ and that $z = 3x^2 + 6x + 5$; compute $\frac{dw}{dx}$ **using the Leibniz form of the Chain Rule**. (In particular, when doing this exercise, *write explicitly the Leibniz form of the chain rule that you are going to use.*)

7. Compute: $\frac{d}{dx} [\sin(2x^5 + 5x^2)] =$

8. Compute: $\frac{d}{dx} \left[\left(\frac{5x^2 + 10x + 15}{2x^2 + 6x} \right)^{100} \right] =$

9. Compute: $\frac{d}{dx} [\tan^5 (2x^2 + 4x)] =$

10. Given that $x^3 - x^2y^4 = \tan (y)$, compute $\frac{dy}{dx}$

11. Given that $f(x) = 3x^2 - 4x + 5$, compute $f'(x)$ **using the definition of derivative.**
(i.e., using the “limit process.”)

Extra (Wow! 10 Points)

Given that $T'(x) = \frac{1}{1+x^2}$ (i.e., $\frac{d}{dx}[T(x)] = \frac{1}{1+x^2}$); compute $\frac{d}{dx}[T(\tan(x))]$