

Math 131 - Quiz 5

February 20, 2023

Name key

Score _____

Show all work to receive full credit. Supply explanations when necessary.

1. (8 points) Use derivative rules to determine each derivative. Do not simplify your answers.

$$(a) \frac{d}{dx} (1 + x + 2x^2 + 3x^3) = 0 + 1 + 4x + 9x^2 = \boxed{1 + 4x + 9x^2}$$

$$(b) \frac{d}{dx} \left(\sqrt{x} + \frac{5}{x^2} \right) = \frac{d}{dx} \left(x^{1/2} + 5x^{-2} \right) = \boxed{\frac{1}{2}x^{-1/2} - 10x^{-3}}$$

$$(c) \frac{d}{dx} (5x^3 \tan x) = \boxed{15x^2 \tan x + 5x^3 \sec^2 x}$$

$$(d) \frac{d}{dx} \left(\frac{x^2 + 1}{\cos x} \right) = \frac{(\cos x)(2x) - (x^2 + 1)(-\sin x)}{\cos^2 x}$$
$$= \boxed{\frac{2x \cos x + (x^2 + 1) \sin x}{\cos^2 x}}$$

2. (2 points) Find an equation of the line tangent to the graph of $y = x^8 - x$ at the point where $x = 1$.

$$\frac{dy}{dx} = 8x^7 - 1$$

$$\text{Slope} = \left. \frac{dy}{dx} \right|_{x=1} = 8 - 1 = 7$$

$$\text{Point: } x=1, y=1-1=0$$
$$(1, 0)$$

TANGENT LINE IS

$$y - 0 = 7(x - 1)$$

OR

$$\boxed{y = 7x - 7}$$