

Math 131 - Quiz 5

February 22, 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.

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

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

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

$$(d) \frac{d}{dx} \sqrt{\sin x} = \frac{d}{dx} (\sin x)^{1/2} = \frac{1}{2} (\sin x)^{-1/2} (\cos x)$$
$$= \frac{\cos x}{2\sqrt{\sin x}}$$

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

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

$$\text{Slope} = m = 8(1)^7 - 1 = 8 - 1 = 7$$

$$\text{Point: } x = 1 \Rightarrow y = (1)^8 - 1 = 0$$

(1, 0)

TAN LINE:

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

or

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