

Math 131 - Quiz 6

October 4, 2023

Name key

Score _____

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

1. (4 points) Determine each derivative. Do not simplify your answers.

$$(a) \frac{d}{dx} [5\sqrt{x} \sec x] = \frac{d}{dx} [5x^{1/2} \sec x]$$

$$= \frac{5}{2} x^{-1/2} \sec x + 5x^{1/2} \sec x \tan x$$

$$(b) \frac{d}{dt} \frac{5t^3 - 8t^2 - 9t}{\cos t} = \frac{(15t^2 - 16t - 9) \cos t - (5t^3 - 8t^2 - 9t)(-\sin t)}{\cos^2 t}$$

2. (2 points) Let $y = x - 3x^4 - \sin x$. Find $\frac{d^2y}{dx^2}$.

$$\frac{dy}{dx} = 1 - 12x^3 - \cos x$$

$$\frac{d^2y}{dx^2} = -36x^2 + \sin x$$

3. (4 points) An object is thrown upward in such a way that its height after t seconds is given by $s(t) = -16t^2 + 32t + 128$, where s is measured in feet.

- (a) What is the maximum height of the object?

$$s'(t) = -32t + 32 = 0$$

↓

$$t = 1$$

$$s(1) = -16 + 32 + 128$$

$$= 144 \text{ FT}$$

- (b) What is the object's velocity when it hits the ground?

$$s(t) = 0 \Rightarrow -16t^2 + 32t + 128 = 0$$

$$-16(t^2 - 2t - 8) = 0$$

$$-16(t - 4)(t + 2) = 0$$

$$t = 4$$

$$s'(4) = -32(4) + 32$$

$$= -96 \text{ FT/SEC}$$