Math 251: Quiz 5 Oct 5, 2019

Name: ______ / 25

There are 25 points possible on this quiz. No aids (book, calculator, etc.) are permitted. Show all work for full credit.

1. [15 points] Find the derivatives of each of the following. You do not need to simplify your answer.

a.
$$h(\theta) = e^2 \sec(\theta) + \csc(\theta)$$

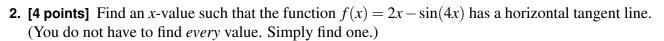
b.
$$y = \sin(5x^2)$$

$$\mathbf{c.} \ f(x) = \frac{\tan(x)}{x + 4\cos(x)}$$

d.
$$f(q) = q^3 e^{6q+5}$$

e.
$$k(t) = (\sqrt[4]{t} - 7t + 3)^4$$

Math 251: Quiz 5	Oct 5, 2019
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3. [6 points] In a certain experiment involving bacteria, the number *N* of bacteria in a culture after *t* days is modeled by the function

$$N(t) = 800 \left(1 + \frac{3}{(t^2 + 1)^2} \right).$$

a. How many bacteria are in the culture at the beginning of the experiment?

b. Compute N'(t). (You do not need to simplify, but you may if you choose.)

c. After one day, is the number of bacteria in the culture **increasing** or **decreasing**, and how do you know? (Justify your answer; an answer with no justification will receive no credit.)