

Name: \_\_\_\_\_ / 20

There are 20 points possible on this quiz. No aids (book, calculator, etc.) are permitted. Show all work for full credit.

1. [10 points] For each function below, find its derivative. You do not need to simplify your answer.

a.  $f(x) = 2 \cos(x) - \sec(x)$

b.  $r = \frac{3}{2} (\sin(\pi\theta))^3$

c.  $y = \tan(3x^2 + 2)$

d.  $g(x) = x^2 e^x (2 - x^3)^5$

e.  $s(t) = \frac{\sin(t^{3/2})}{e^{2t} - t}$

2. [6 points] The displacement of a particle on a vibrating string is given by the equation

$$s = 8 \cos\left(\pi t + \frac{\pi}{4}\right),$$

where  $t$  is measured in seconds and  $s$  is measured in centimeters.

- a. Calculate the velocity and acceleration of the particle at any time  $t$ .
  
  
  
  
  
  
  
  
  
  
- b. Using the results from part (a), determine the position, velocity and acceleration of the particle at  $t = 1$  second including **units**.

3. [4 points] Find the equation of the tangent line to the curve  $y = \frac{1}{\sqrt{1+4x}}$  at the point  $(0, 1)$ .