

## Exam 2 Practice Problems – Calculus I

Below is a set of practice problems covering each of the topics on the study guide. It is not enough to work only these problems. You should also review your quiz problems, pertinent homework problems, and end of chapter review in the text, but focus only on those problems mentioned in the study guide.

1. Find the derivative of each function.

(a)  $f(x) = x\sqrt{1 + e^{4x}}$

(b)  $f(x) = \frac{e^x}{1 + xe^x}$

(c)  $f(x) = 6^{\ln x}$

(d)  $f(x) = \sec(\sinh e^x)$

2. Use logarithmic differentiation to find  $f'(x)$  for  $f(x) = (\sin x + 1)^x$

3. Use logarithmic differentiation to find  $f'(x)$  for  $f(x) = \frac{x(1 + \csc x)^3}{\sqrt{\ln(e^x + x) + x^3}}$

4. Use implicit differentiation to find  $y'$  if  $\sin(e^y) + x^4y^{-2} = \pi + e^xy^2$

5. A state trooper is parked 20 ft from the side of the highway. A car drives by. When the car is 30 ft past the trooper (measured along the highway, not the actual distance between the car and the trooper), his radar gun indicates that the distance between the trooper and the car is changing at the rate 63 mph. How fast is the car travelling?

6. Air is pumped into a balloon at the rate  $0.2 \text{ m}^3/\text{min}$ . How quickly is the radius changing when the radius is 0.1 m?

7. Use a linear approximation to estimate  $15.97^{3/2}$

8. Use a linear approximation to estimate  $e^{-0.06}$

9. The radius of a sphere is measured as  $50 \pm 1.3$  cm. Find the maximum possible error in the calculation of the volume of the sphere, and find the maximum relative error.

10. The radius of a circle is measured as  $50 \pm 0.8$  cm. Find the maximum possible error in the calculation of the area of the circle, and find the maximum relative error