

## Homework 9 - Math 140

Name: \_\_\_\_\_

Calculate the following derivatives.

1.  $\frac{d}{dx} \frac{x}{x-2}$

2.  $\frac{d}{dy} e^{-5y}$

3.  $\frac{d}{dx} \frac{1}{x^2 + 5x + 6}$

4.  $\frac{d}{dx} (e^x + x^2)^5$

5.  $\frac{d}{dx} x e^{-x^2}$

6.  $\frac{d}{dx} \frac{2e^x}{x^2}$

7.  $\frac{d}{dx} \ln(x^2 + 4x)$

8.  $\frac{d}{du} (e^u + 1)^{-1}$

9. A cup of hot water is set out to cool. Its temperature (in Fahrenheit) is  $T(t) = 70 + 80e^{-0.1t}$  where  $t$  is the time since it was set out, in minutes.

(a) What is the derivative of the temperature function?

(b) Use a calculator to find  $T'(4)$ . Explain clearly what this value tells us about the rate of change in temperature.

10. Find the  $x$ -value where the tangent of the function  $f(x) = 4e^{-x} + x$  has slope equal to zero.

