

**Instructions:** Please work the following problems on other pieces of paper. You must show all work and calculations in order to receive full credit. I would prefer to collect your assignments in class on the day it is due, but I will accept it as late as 5:00 PM on the due date. Assignments submitted later will receive 50% credit.

1. Suppose  $g(x) = \sqrt[5]{7 - 2e^x}$ . Find  $g'(x)$ .
2. Section 4.3 # 12.
3. Section 4.3 # 24.
4. Section 4.3 # 28.
5. Section 4.3 # 40.
6. Let  $F(x) = e^{x \ln x}$ .
  - (a) Find  $F'(x)$ .
  - (b) Use your answer in part(a) to write a formula for  $\frac{d}{dx} [x^x]$ . *Hint:*  $e^{x \ln x} = (e^{\ln x})^x$ .
  - (c) Using part (b) and the chain rule, write a formula for  $\frac{d}{dx} \{[f(x)]^{f(x)}\}$ .
7. Section 4.4 # 20.
8. Section 4.4 # 22. Try to write your final answer in terms of  $x$  only (no  $y$ 's).
9. Consider the equation  $x^2 + y^2 = 4$ .
  - (a) Find the equation of the line tangent to the graph of  $x^2 + y^2 = 4$  at the point  $(6/5, 8/5)$ .
  - (b) Draw a picture of the graph of  $x^2 + y^2 = 4$  and the tangent line you found in part (a) on the same axis.
10. Section 4.4 # 44.
11. Section 4.4 # 56.
12. A snowball is rolling down a snowy hillside gathering snow. The radius of the snowball is growing at the rate of 0.25 inches per second. At what rate is the surface area of the snowball increasing when its radius is 30 inches? *Hint:* The formula for surface area is  $A = 4\pi r^2$ .
13. A 25-foot ladder is leaning up against a wall. Due to the slippery floor, the base of the ladder is sliding away from the wall at a rate of 0.5 feet per second. How fast is the top of the ladder sliding down the wall when the base of the ladder is 7 feet from the wall? *Hint:* Use the Pythagorean Theorem equation  $x^2 + y^2 = 25^2$ .