Homework II Second-Half

Due in class June 06 2017

0. Read The Following Sections:
  Chapter 6. Differentiation: Section 6.10 Exponential Function, 6.11 Logarithmic Function
  Chapter 7. Derivatives in Use: Section 7.1 Implicit Differentiation, 7.2 Economic Examples, 7.3 Differentiating the Inverse

1. Find the derivative of $f(x) = e^{x^3+2x^2}$

2. Find the derivative of $f(x) = \ln(e^{2x} + 1)$

3. Find the derivative of $f(x) = 3^{x+1} \ln(x - 1)$

4. Find the derivative of $f(x) = x^4e^{-2x}$

5. Find all the intervals on which $f(x) = e^{-x^2}$ is decreasing and convex.

6. Use logarithmic differentiation to find $f'(x)$ where $f(x) = \left(\frac{x+1}{x-1}\right)^{\frac{3}{2}}$ and $x > 1$

7. Use logarithmic differentiation to find the derivative of $f(x) = (x^2 + 1)^x$

8. Consider the equation $2xy - 3y^2 = 9$, assume $y$ is a function of $x$.
   (a). Find the equation of the tangent line to the curve of the equation at $(x, y) = (6, 1)$
   (b). Compute $y''$

9. $f(x) = x^5 + x^3 + 2x + 1$.
   (a). Show that $f$ has inverse function.
   (b). If $g$ is the inverse function of $f$, compute $g'(1)$