# Review Problems

## October 5, 2016

Chain Rule:

1. (Fall 2005, Exam 2, #6) Find $D^{125}(xe^{-x})$.

2. (Fall 2008, Exam 2, #5) If $f(x) = \sqrt{x}e^{x-4}$, then find $f'(4)$.

3. (Fall 2008, Exam 2, #6) If $f(x) = (1 + \sin(2x))^{10}$, then find $f'(\frac{\pi}{2})$.

4. (Fall 2008, Exam 2, #7) If $g(x) = \tan\left(\frac{\pi}{2}f(x)\right)$ where $f(0) = 0$ and $f'(0) = 2$, then find $g'(0)$.

5. (Fall 2009, Exam 2, #8) Find the derivative of $f(x) = 2^{(x^2+3x+2)}$ at $x = 0$.

6. (Fall 2010, Exam 2, #12) If $f(x) = (\cos(2x))^3$, find $f'(\pi/3)$.

Implicit Differentiation:

1. (Fall 2002, Exam 2, #8) Find the slope of the tangent line to the curve defined by $x + \sin y = xy$ at the point $(0,0)$ on the curve.

2. (Fall 2003, Exam 2, #10) If $y = \cosh 2x$, find $f''(x)$.

3. (Fall 2005, Exam 2, #10) Given $x^y = y^x$, find $\frac{dy}{dx}$.

4. (Fall 2008, Exam 2, #10) Use implicit differentiation to find $\frac{dy}{dx}$ at the point $(1,2)$ if $x^4 - 3x^2y + y^2 + y^3 = 7$.

5. (Fall 2009, Exam 2, #9) Suppose that $C$ is the curve defined by $2y^2 - xy^3 - x + 2 = 0$. Find an equation of the tangent line of $C$ at the point $(2,1)$.

6. (Fall 2010, Exam 2, #10) If $y$ is a differentiable function of $x$ and $xy - (x + y)^2 + \sqrt{y} + 19 = 0$, find $\frac{dy}{dx}$ at the point $(1,4)$.