Quiz 2   Name: _____
Math 1220–7
September 7, 2012

Directions: Show all work for full credit. Clearly indicate all answers. Simplify all mathematical expressions completely. No calculators are allowed on this quiz. Each question is worth 12 points.

1. Evaluate each of the following, given that $D_x(a^x) = a^x \ln a$:

   (a) $D_x(6^{2x})$

   (b) $\displaystyle\int x2^{x^2}\,dx$

2. Use logarithmic differentiation to calculate $\dfrac{dy}{dx}$ if $y = (x^2 + 1)^{\ln x}$.

3. Solve the differential equation $\dfrac{dy}{dt} = -6y$, subject to the condition $y(0) = 4$.

4. Use the fact that $e = \lim\limits_{h \to 0}(1 + h)^{1/h}$ to find $\lim\limits_{x \to 0}\left(1 + 3x\right)^{1/x}$.

5. Solve the following differential equation (Hint: The integrating factor is $e^{\int P(x)\,dx}$.)

$$\frac{dy}{dx} + \frac{y}{x} = \frac{1}{x}$$