Calculus 1 Assignment 3 Fall 2013 Name:_____

1. Find the derivative of $y = \sqrt{\dfrac{x^2e^x - 2xe^x}{3x^2 + \sqrt{7}}}$.

2. If $h(x) = \sqrt{4 + 3f(x)}$, where $f(1) = 7$ and $f'(1) = 4$, find $h'(1)$.

3. Find $\dfrac{dy}{dx}$ by implicit differentiation if

$$e^{\frac{x}{y}} = x^2 - y^2.$$

4. Find the derivative of the function $f(t) = \sqrt{t}^t$.

5. Two curves are *orthogonal* if their tangent lines are perpendicular at each point of intersection. Two families of curves are orthogonal trajectories of each other if every curve in one family is orthogonal to every curve in the other family. Show that the family of circles $x^2 + y^2 = r^2$ and the family of lines $ax + by = 0$ are orthogonal trajectories of each other.

6. A loaf of bread is removed from the oven when it reaches an internal temperature of 200°F and placed on a table in a room where the temperature is 75°F. If the temperature of the bread is 190^0F after half an hour, what is the temperature after 2 hours?