Math 113 Exam #2 Practice Problems

1. Let $u(x) = \sqrt{f(x)}$ and suppose $f(3) = 1$, $f'(3) = 8$, and $f''(3) = -2$. What is the value of $u''(3)$?

2. Let $f(x) = \frac{1}{2}\sin(x^2)\cos(x^2)$. What is $f'\left(\sqrt{\frac{5\pi}{6}}\right)$?

3. Suppose you've leaned a 10 foot ladder against a vertical wall, but haven't properly secured the bottom of the ladder. Before you can climb onto the ladder, the bottom starts to slide away from the wall at 3 ft/sec. How fast does the top of the ladder slide down the wall when the bottom is 6 feet from the wall?

4. Suppose a cup of boiling water is left to cool on the counter. If the room temperature is $20°$ C and the water has a temperature of $60°$ C after 10 minutes, what will be the temperature of the water after half an hour? (Remember that water boils at $100°$ C)

5. What is the tangent line to $x^3 + y^3 = 6xy$ at $(3,3)$?

6. Suppose $y = x^{1/x}$. What is $\frac{dy}{dx}$?

7. Use a linearization of an appropriate function to estimate $\ln(0.9)$.