MATH 234: HOMEWORK 6

DUE: FRIDAY, JULY 8 VIA ILLINOIS COMPASS

1. If $e^{-x} = 6$, find x in terms of the natural logarithm.

2. Differentiate $e^{x^2} + 2\ln(x^e)$ with respect to x.

3. Differentiate $x^3 \ln(x)$ with respect to x.

4. Use logarithmic differentiation to differentiate

$$4^x \cdot 5^x \cdot 6x^3$$

with respect to x.

5. A bacterial culture grows exponentially, that is, $P(t) = 100e^{kt}$, where $P(t)$ is the size of the culture at time t hours. Suppose that after 2 hours the size of the culture is 400. What is k (approximately)?

6. A radioactive substance is observed to disintegrate at a rate such that $\frac{9}{10}$ of the original amount remains after one year. What is the half-life of this substance?

7. \$1000 is invested at 6% interest compounded continuously. What is the value of the investment after 5 years?

8. How much money has to be invested now at 8% continuous interest in order to have \$1000 after 5 years?

9. Determine the percentage rate of change of $f(x) = e^{0.9x}$ at $x = 15$ and $x = 30$.

10. For the demand function $q = 150(245 - p^2)$, find $E(p)$ and determine if the demand is elastic or inelastic (or neither) at the price $p = 7$.