MATH 34A, Midterm 2 Practice Problems

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1. Solve $7^x = 2^{x+4}$ for x.

2. Combine the following into a single logarithm: $2ln(x) + 3ln(y) - ln(z)$.

3. Split up the following into logarithms of a single variable: $log(xy/z^2)$.

4. Simplify: (a) $e^{2ln(5)}$ (b) $log(10)$ (c) $10^{log(6)}$ (d) $log(10^{-3})$ (e) $10^{2+log(5)}$.

5. A population of rabbits is doubling every 2 years. In 1970 there were 500 rabbits. How many rabbits are there in 1980? When will there be 3000 rabbits?

6. Find the derivatives of: (a) $2/x^3$ (b) $5e^{4x}$ (c) $(x+1)(3x+2a)$ where a is a constant (d) $(2x-c)^2$ where c is a constant (e) $x^{2e} + e^{2x}$

7. Suppose $f(t) = 2t^3 - 3t^2 - 12t + 1$ is the position in miles of a car after t hours.
(a) Find the velocity and acceleration of the car after 30 minutes.
(b) Where is $f(t)$ increasing?
(c) Where is $f(t)$ concave up?
(d) Find the average velocity between the 1st and 2nd hours.

8. Find the equation of the tangent line to $f(x) = x^2$ at $x = 3$. Graph $f(x)$ and this tangent line.

9. Let $f(x) = 2x^2 + 1$. Show that $f'(x) = 4x$ using the definition of derivative.