Math 165 Dummy Exam II Lowman Fall 2010

Do not use substitution for the integrals below. Calculators cannot be used:

1. Write the general forms of the Power Rule, Exponential Rule and Log Rule for derivatives.
2. Write the general forms of the Power Rule, Exponential Rule and Log Rule for integrals.
3. Write down all of the Log Rules used this semester. When possible, write them using base $\boldsymbol{e}$.
4. $\int_0^1 (3x^2 + 10x^4)(2x^3 + 4x^5 + 1)^9 dx$
5. $\int_1^2 \frac{6x^2+20x^4}{(2x^3+4x^5+1)} dx$
6. $\int_2^3 (6x^2 + 20x^4)e^{(2x^3+4x^5+1)} dx$
7. A fenced in retangular area must have an area of $20,000m^2$. If fencing is only required on three sides, what should the dimensions of the fence be so the total length of fence used is a minimum? What is the length of the fence? Use the second derivative test to justify that your answer gives a minimum.
8. An economist has compiled the following data on the gross domestic product (GDP) of a certain country. It is known that the GDP is increasing exponentially. First use the data to find an expression that can be used to predict the GDP at future times. Use the expression to predict the GDP in the year **2010** if the GDP is increasing exponentially. GDP in billions is:

Year	**1990**	**2000**
GDP in billions	**100**	**200**

9. Use logarithmic differentiation to find $f'(x)$ at $x = 1$ if $f(x) = (4 + 3x)^{2x}$.
10. Solve the following equation for x. Give the exact answer. Show your work.

$$\ln(4e^x) + \log_2(1) \cdot (x^2 + 1) + ln(e) \cdot \ln(2e^{3x}) = \ln(16) + \ln(e^2) - 2$$

11. How many years will it take **\$1000** to grow to **\$1,000,000** if compounded quarterly and invested at **10%** per year? Give an expression that can be evaluated on a calculator.
12. Repeat the preveous problem if it is compounded continuously.
13. Use a log rule to change the expresson from base **2** to base e. $\log_2 100.7$.