Due on Thursday in Discussion the day before Exam 2.

Part I
Integration

- Write the general forms of the Power Rule, Exponential Rule and Log Rule for derivatives.
- Write the general forms of the Power Rule, Exponential Rule and Log Rule for integrals.

Find the following integrals. Use the general forms of the power, exponential and log rules. Do not use the method of substitution. You must show your work to receive credit.

1. $\int 5e^{3x} + \frac{1}{3x} - \frac{1}{2}x^{3/2}dx$
2. $\int (3x+4)^5 dx$
3. $\int \sqrt[4]{x^3}dx$
4. $\int \frac{5x^4+4x^3-10}{x^3}dx$
5. $\int e^{5x}dx$
6. $\int \frac{1}{3x+5}dx$
7. $\int [(x-1)^5 + 3(x-1)^2 + 5]dx$
8. $\int 2xe^{x^2-1}dx$
9. $\int 3t\sqrt{t^2+8}dt$
10. $\int x^5 e^{1-x^6}dx$
11. $\int \frac{y^2}{(y^3+5)^2}dy$
12. $\int (3x^2-1)e^{x^3-x}dx$
13. $\int \frac{10x^3-5x}{\sqrt{x^4-x^2+6}}$
14. $\int \frac{1}{x\ln x}dx$
15. $\int \frac{6u-3}{4u^2-4u+1}du$
16. $\int \frac{\ln x^2}{x}dx$
17. $\int \frac{e^{\sqrt{x}}}{\sqrt{x}}dx$

Part II

Logarithms and Exponentials

1. Write down all of the Log Rules used this semester and give an example of each.

2. An economist has compiled the following data on the gross domestic product (GDP) of a certain country. Use these data to predict the GDP in the year **2010** if the GDP is increasing exponentially. GDP in billions is:

Year	**1990**	**2002**
GDP in billions	**100**	**150**

   (a) 197 billion
   (b) 225 billion
   (c) 365 billion
   (d) 150 billion
   (e) 300 billion

3. Use logarithmic differentiation to find $\boldsymbol{f'(x)}$ at $\boldsymbol{x = 1}$ if $\boldsymbol{f(x) = (2 + 3x)^x}$.

   (a) 10.05
   (b) 11.05
   (c) 18.05
   (d) 21.05
   (e) 24.31

4. Solve the following equation for x. Give your answer to 4 decimal places. Show your work.

$$\boldsymbol{\ln(4e^x) + \ln(2e^{3x}) = \ln(16)}$$

   (a) .4545
   (b) .1733
   (c) .3660
   (d) .1111
   (e) .2310

5. How many years will it take **\$1000** to grow to **\$1,000,000** if compounded quarterly at invested at **10%** per year?

   (a) 130.6 years
   (b) 25.3 years
   (c) 69.9 years
   (d) 73.2 years
   (e) 87.2 years

6. Repeat the preveous problem if it is compounded continuously.

7. Find $\boldsymbol{\log_{1.4} 100.736}$. Use your calculator.