Practice Midterm
MAT-16B Short Calculus - II

Spring 2011

Name _____

- **This test is closed notes, closed book.**
- **Laptops and calcultors are NOT allowed.**
- **There are 8 pages and 5 questions total.**
- **You can leave an answer as a numerical expression without computing the final value. For example, this is a perfectly acceptable answer :**

  $((250 - 63)/(1 - e^{(-6*3.5)})) * ln(27/168)$. **Show your work clearly !!**
- **The maximum score in the test is 80 points.**

Signature _____

Problem	Score	Max Possible
1		10
2		20
3		10
4		10
5		30
Total		80

1. **(10 pts)** For each of the following pair of statements, circle the correct statement :

   (a) $\quad 4^x/4^y = 4^{x-y}$ $\qquad\qquad$ $4^x/4^y = 4^{x/y}$.

   (b) $\quad \int \frac{f(x)}{g(x)}dx = \frac{\int f(x)dx}{\int g(x)dx}$ $\qquad$ $\int [f(x)+g(x)] = \int f(x) + \int g(x)$.

   (c) $\quad log_7 x = \frac{ln(x)}{ln(7)}$ $\qquad\qquad$ $log_7 x = ln(7)ln(x)$.

   (d) $\quad (lnx)^5 = 5ln(x)$ $\qquad\qquad$ $ln(x^5) = 5ln(x)$.

   (e) $\quad ln(x) + ln(y) = ln(x+y)$ $\qquad$ $ln(x) + ln(y) = ln(xy)$.

2. **(20 pts)** Differentiate the following functions.

   (a) $\frac{e^x + e^{-x}}{2}$.

   (b) $ln(x\sqrt{4+x^2})$.

   (c) $(e^x + x^2)^2$.

(d) $x2^x$.

(e) $(x+1)^{5x}$.

3. A bank offers 5% yearly rate of interest.

   (a) **(3 pts)** I deposit \$1000 at the beginning of the year. The interest in the bank is compounded yearly. How much money do I have at the end of 5 years ?

   (b) **(3 pts)** Now suppose the interest in the bank is compounded every 6 months, that is, it is compounded 2 times a year. If I deposit \$1000 at the beginning of the year, how much will I have after 5 years ?

   (c) **(4 pts)** Now suppose the interest in the bank is compounded continuously. If I deposit \$1000 at the beginning of the year, how much time does it take for the amount to become \$3000 ?

4. **(10 pts)** Consider the exponential growth function

$$y = Ce^{kt}.$$

Suppose we know that $y = 5$ when $t = 1$, and $y = 10$ when $t = 2$. Compute the values of C and k.

5. **(30 pts)** Compute the following integrals.

(a) $\int \frac{(ln(x))^2}{x} dx$

(b) $\int \frac{x^2+5}{\sqrt{x}} dx$

(c) $\int x^2 e^{x^3} dx$

(d) $\int \frac{x^4+4x^3+3}{x+4}dx$

(e) $\int \frac{e^{-x}}{1-e^{-x}}dx$