MIDTERM I
Math 126, Section A
January 25, 2007

Problem	Total Points	Score
0	1	
1	6	
2	12	
3	15	
4	7	
5	9	
Total	50	
6(Bonus)	5	

- You may use a scientific calculator and one one-sided sheet of handwritten notes. No other notes, books or calculators are allowed. Please turn off your cell phone.

- Show all your work to get full credit.

- Read instructions for each problem CAREFULLY.

- Leave all your answers in EXACT form.

- Check your work!

0. (1pt) This is a multiple choice question. Circle the appropriate answer to each question. You will get credit for answering all three questions, *independently* of your answers.

I. Which part of the lecture room do you usually sit in

   (a) First quarter (closest to the board)
   (b) Second quarter
   (c) Third quarter
   (d) Fourth quarter (farthest from the board)

II. How well do you hear the instructor? Check whether you hear

   (a) almost nothing
   (b) $< 25\%$
   (c) $25 - 50\%$
   (d) $50 - 75\%$
   (e) $> 75\%$
   (f) almost 100%
   (g) you do not come to lectures

III. Which tool do you prefer for the instructor to use:

   (a) the whiteboard
   (b) the overhead projector

1. (6pts) Find the Taylor series for the function $f(x) = e^x$ based at $a = 1$.

2. (12pts) Let $f(x) = \int\limits_{0}^{x} \frac{\cos t - 1}{t^2} dt$.

(a) (9pts) Find the Taylor series of $f(x)$ based at $a = 0$.

(b) (3pts) Find $f^{(5)}(0)$.

3. (15pts) Let $f(x) = \cos 2x$.

   (a) (5pts) Find the Quadratic approximation for $f(x)$ at $a = 0$.

   (b) (5pts) Find the error bound for the Quadratic approximation above on the interval $[-0.5, 0.5]$.

(c) (5pts) Find the nth Taylor polynomial $T_n(x)$ of $f(x)$ based at $a = 0$ such that the error $|T_n(x) - \cos 2x|$ is at most 0.1 on the interval $[-0.5, 0.5]$.

4. (7pts) Check whether the points $(1, 2, 3)$, $(-2, 5, 7)$, and $(-5, 8, 11)$ lie on the same line.

5. (9pts) Find the angle between the two main diagonals of a unit cube.

(A unit cube is a cube with the vertices $(0, 0, 0), (1, 0, 0), (0, 1, 0), (0, 0, 1), (1, 1, 0), (1, 0, 1),$ $(0, 1, 1), (1, 1, 1)$; the main diagonals are the diagonals connecting the vertex $(0, 0, 0)$ with the vertex $(1, 1, 1)$, and the vertex $(1, 0, 0)$ with the vertex $(0, 1, 1))$.

6. (5pts) (*Bonus, full credit only*). Find the 10th Taylor polynomial based at $a = 0$ for the function $f(x) = e^{\cos x}$.