Math 126 C - Spring 2007
Mid-Term Exam Number One
April 19, 2007

Name: ___________________________________________  Section: ____________

<table>
<thead>
<tr>
<th></th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>50</td>
</tr>
</tbody>
</table>

- Complete all questions.
- You may use a scientific, non-graphing calculator during this examination. Other electronic devices are not allowed, and should be turned off for the duration of the exam.
- If you use a trial-and-error or guess-and-check method, or read a numerical solution from a graph on your calculator, when an algebraic method is available, you will not receive full credit.
- You may use one hand-written 8.5 by 11 inch page of notes.
- Show all work for full credit.
- You have 50 minutes to complete the exam.
1. Let \( f(x) = e^x \sin x \).

(a) Find the second-order Taylor polynomial \( T_2(x) \) for \( f(x) \) based at \( b = 0 \).

(b) Give a bound on the error \( |f(x) - T_2(x)| \) for \( x \) in the interval \(-0.1 \leq x \leq 0.1\).
2. Find the first four non-zero terms of the Taylor series for

\[ f(x) = xe^{x^2} - \frac{1}{4 + x^2} \]

based at \( b = 0 \).
3. Find the equation of the plane containing the line of intersection of the two planes

\[ x + y + z + 5 = 0 \text{ and } 3x + 2y - z + 2 = 0 \]

and the point \((1, 2, 1)\).
4. Find the point of intersection of the two lines

\[ x = 4 - t, \quad y = 6 + 2t, \quad z = -1 + 3t \quad \text{and} \quad x = 1 + 2t, \quad y = 14 - 8t, \quad z = 7 - 4t. \]
5. Let $S$ be the surface defined as the set of points $p$ (in three-dimensional space) such that the distance from $p$ to the plane $y = 5$ equals the distance from $p$ to the line $y = 1, z = 2$.

(a) Find an equation for $S$.

(b) Find the equation of the trace of $S$ in the plane $z = 6$. Describe the trace (i.e. what kind of curve is it?).