Math 126 C - Winter 2006
Mid-Term Exam Number Two
February 16, 2006

Name: ________________________________  Section: __________

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- 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. Eliminate the parameter in the following parametric equation pair to get a Cartesian equation for the curve that involves no trigonometric functions.

\[ x = \cos t, \ y = \sin t - \cos t \]
2. Consider the curve defined parametrically by the parametric equations

\[ x = \ln \ln t, \quad y = \ln t - (\ln t)^2. \]

Find the equation of the tangent line to the curve at the point \( t = e \).
3. Find the parametric equations for the tangent line to the curve defined by

\[ x = t^3 - t, \quad y = t^6 + t^2 + 1, \quad z = \frac{1}{2}t^2 + 5t \]

at the point \((0, 1, 0)\).
4. At what point does the curve \( y = e^x \) have maximum curvature?
5. Find the length of the curve defined by

$$\vec{r}(t) = \left\langle \frac{2\sqrt{2}}{3} t^{3/2}, t, \frac{1}{2} t^2 \right\rangle, 0 \leq t \leq 4$$
6. Find the curvature of the curve defined by

\[ \vec{r}(t) = \left\langle \frac{1}{2} t^2 - 2t, t^2 - t, t^2 + t \right\rangle \]

at the point \( t = 0 \).