

Math 126
Exam 3
December 1, 2006

Name: _____

1. Your exam contains 5 questions and 6 pages; Please make sure you have a complete exam.
2. The entire exam is worth 100 points. Point values for problems vary and these are clearly indicated. You have 50 minutes for this exam.
3. Make sure to **ALWAYS SHOW YOUR WORK**; you will not receive any partial credit unless all work is clearly shown. If in doubt, ask for clarification.
4. If you need extra space, use the back page of the exam and clearly indicate this.
5. You are allowed one 8.5×11 sheet of handwritten notes (both sides). Graphing and scientific calculators are allowed.
6. Leave answers in exact form (as simplified as possible) or round to 4 decimal places.

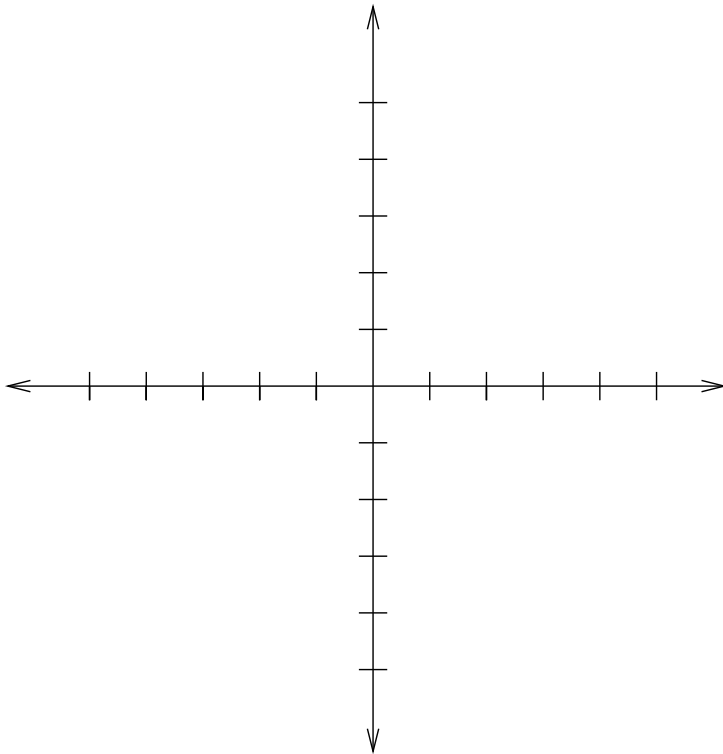
Problem	Total Points	Score
1	20	
2	30	
3	10	
4	20	
5	20	
Total	100	

1. (20 pts.) $\vec{r}(t) = \langle e^t - 4, 2\sqrt{t} \rangle$

(a) (6 pts.) Find the velocity and acceleration vectors for the given position vector \vec{r} at the point $(e - 4, 2)$.

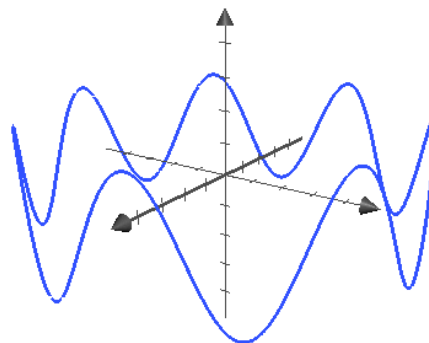
(b) (14 pts.) Sketch the following on the axis below:

- i. The curve described by the vector function \vec{r} for $t \geq 0$. Indicate with an arrow the direction in which the curve is traced as t increases.
- ii. The velocity and acceleration vectors for $t = 1$.



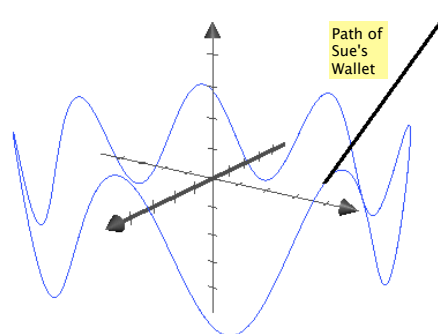
2. (30 pts.) Sue has decided to go on a carnival ride called the Vominator. Placing coordinates so that the center of the ride is the origin, Sue's position on the ride is given by $\vec{r}(t) = \langle 6\cos(t), 6\sin(t), 2\sin(7t) \rangle$ where t is in seconds and the coordinates are in meters. The path of the ride is shown below.

- (a) (10 pts.) What is the **speed** at which Sue is moving at $\frac{\pi}{2}$ seconds?



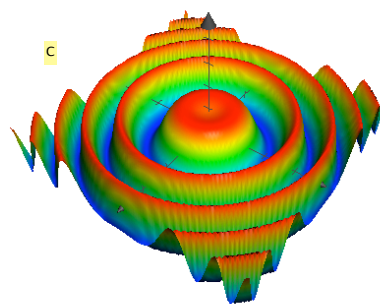
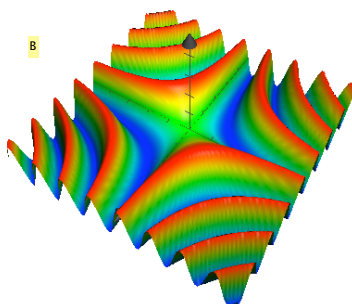
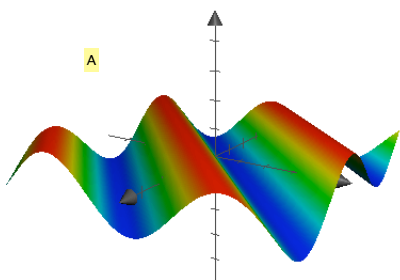
- (b) (10 pts.) Set up and simplify, but do not evaluate, the integral needed to compute the total distance travelled by Sue from 0 seconds to 5 seconds.

- (c) (10 pts.) At $\frac{\pi}{3}$ seconds, Sue's wallet slips out of her pocket and assuming there is no air resistance or gravity, it travels on a trajectory tangent to the position curve (See figure). Where is the wallet located 1 second after it slips out of her pocket?



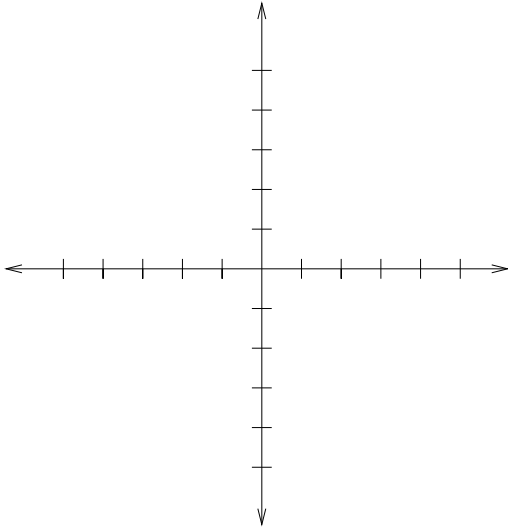
3. (10 pts.) Match the following functions to the graphs below.

- $\sin(x^2 + y^2 + 1)$
- $\sin(xy)$
- $\sin(x - y)$

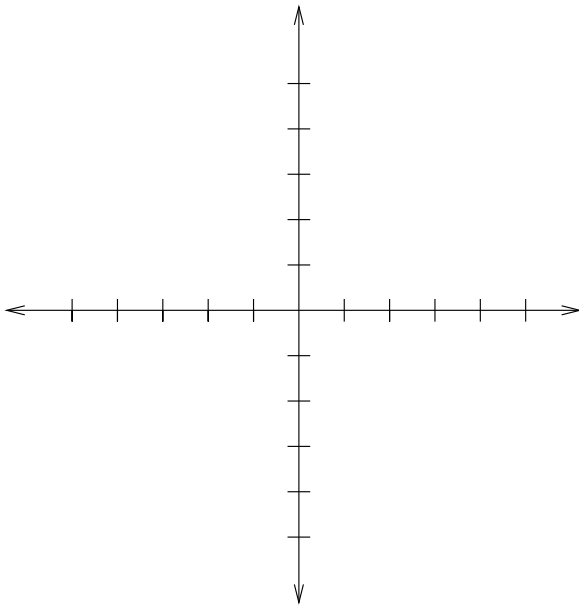


4. (20 pts.) $f(x, y) = \sqrt{1 + x^2 - y}$

(a) (10 pts.) Sketch the domain of the function in the axis below.



(b) (10 pts.) Sketch level curves ($f(x, y) = k$) on the axis below for $k = 0, 1,$ and 2 .



5. (20 pts.) $f(x, y) = x^2 \ln(y) + e^{xy}$

(a) (7 pts.) Compute the first partial derivatives at $(0,1)$.

(b) (7 pts.) Compute $f_{xxy}(x, y)$.

(c) (6 pts.) Compute $\frac{\partial^{50} f}{\partial x^{50}}$ (50th partial derivative of f with respect to x).