NAME: $\qquad$

Math 8<br>due Monday, March 1, 2010<br>Homework \#8 - covers Lectures 21-23

Instructions: Collaboration on homework is encouraged. The use of computing devices is allowed on homework (but not on exams). Please feel free to attach extra pages if your solutions require them. A correct answer with incorrect work will be considered wrong.

FERPA RELEASE: Because of privacy concerns, we are not allowed to return your graded homework in lecture without your permission. If you wish us to return your homework in lecture, please sign on the line indicated below. Otherwise, you will have to pick your homework up in your instructor's office.

SIGN HERE: $\qquad$

| Problem | Points | Score |
| :---: | :---: | :---: |
| 1 | 4 |  |
| 2 | 4 |  |
| 3 | 4 |  |
| Total | 12 |  |

1. (4) Compute the position vector for a particle which passes through the origin at time $t=0$ and has velocity vector

$$
\mathbf{r}(t)=2 t \mathbf{i}+\sin t \mathbf{j}+\cos t \mathbf{k}
$$

2. (4) Consider the curve defined by

$$
\mathbf{r}(t)=\langle 4 \sin c t, 3 c t, 4 \cos c t\rangle
$$

What value of $c$ makes the arc length of the space curve traced by $\mathbf{r}(t), 0 \leq t \leq 1$, equal to 10 ?
3. (4) Show that if a particle moves at constant speed, then its velocity and acceleration vectors are orthogonal. (Hint: consider the derivative of $\mathbf{v} \bullet \mathbf{v}$.)

