MATH 2415 TEST 2

Name: ______________________________

Date: February 13, 2013.

Exercise	Point Possible	Score
1	15	
2	15	
3	15	
4	25	
5	30	
Total	100	

1. [15 points] Circle the best answer.
If velocity is always perpendicular to acceleration, then…

(a) distance from the origin is constant.
(b) speed is constant.
(c) curvature is constant.
(d) torsion is constant.

2. [15 points] Circle the best answer.
If the unit binormal vector of a curve is constant, then…

(a) the curve is a plane curve.
(b) the curvature is always 0.
(c) the torsion is always 0.
(d) both a and b are true.
(e) both b and c are true.
(f) both c and a are true.

3. [15 points] Circle the best answer.
If acceleration $\vec{a}(t)$ is always a scalar multiple of position $\vec{r}(t)$, then…

(a) $\vec{r}(t) \times \vec{v}(t)$ is constant.
(b) $\vec{r}(t) \cdot \vec{v}(t)$ is constant.
(c) $\vec{v}(t) \times \vec{a}(t)$ is constant.
(d) $\vec{v}(t) \cdot \vec{a}(t)$ is constant.

4. [25 points] Suppose that you are driving, your speed is currently 15m/s, your speed is increasing at a rate of 2m/s^2, and the radius of curvature of the road is currently 70m. Calculate the magnitude of your current acceleration vector. Give a numerical answer accurate up to an error of 0.1m/s^2.

5. [30 points] Find the curvature $\kappa(t)$ of $\vec{r}(t) = \langle t, 3\cos t, 3\sin t \rangle$; **show your work**.