Name: _____

PID: _____

Section: _____

Question	Points	Score
1	11	
2	5	
3	5	
4	19	
Total:	40	

1. Write your Name, PID, and Section on the front of your Blue Book.
2. Write the Version of your exam on the front of your Blue Book.
3. No calculators or other electronic devices are allowed during this exam.
4. You may use one page of notes, but no books or other assistance during this exam.
5. Read each question carefully, and answer each question completely.
6. Write your solutions clearly in your Blue Book
   (a) Carefully indicate the number and letter of each question.
   (b) Present your answers in the same order they appear in the exam.
   (c) Start each question on a new page.
7. Show all of your work; no credit will be given for unsupported answers.

1. Let $A = (1, 0, 2)$, $B = (2, 0, 1)$ and $C = (1, 2, 0)$.
   (a) (3 points) Determine whether the angle $\angle BAC$ is acute, right, or obtuse.
   (b) (5 points) Find the area of the triangle ABC.
   (c) (3 points) Find equation of the plane passing through A, B, and C.
2. (5 points) Parameterize the curve of intersection of $x^2 + y^2 = 4$ and $z = y^2$.
3. (5 points) Find a vector parameterization of the line tangent to the curve
$$\mathbf{r}(t) = \langle \ln t, t^2, t + 1 \rangle$$
at $\mathbf{r}(1) = \langle 0, 1, 2 \rangle$.
4. Answer the following questions with short justifications:
   (a) (4 points) Suppose $\mathbf{v} \times \mathbf{w} = \langle 1, 2, 3 \rangle$ and $\mathbf{u} = \langle 1, 0, -1 \rangle$. Find the the volume of the parallelepiped spanned by $\mathbf{v}, \mathbf{w}$ and $\mathbf{u}$.
   (b) (4 points) Find the equation of the plane passing through $P_0 = (1, 1, 1)$ and parallel to the plane $2x + y - z = 0$.
   (c) (4 points) Find the length of $\frac{2}{\|\mathbf{v}\|}\mathbf{v}$.
   (d) (4 points) Suppose $\|\mathbf{v}\| = 2$, $\|\text{proj}_{\mathbf{v}}\mathbf{w}\| = 5$, and the angle between $\mathbf{v}$ and $\mathbf{w}$ is obtuse. Find $\mathbf{v} \cdot \mathbf{w}$.
   (e) (3 points) Find a vector parallel to the line of intersection of the planes $x + y + z = 1$ and $-x + y - z = 0$.

Good Luck!