Pledge:

1/25/2010 MATH361 Calculus III Name:_____
Dr. Lunsford Quiz 1 (40 Points Total)

Please show all work on this quiz.

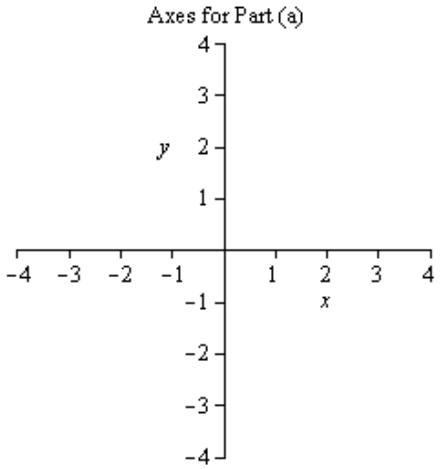
Problem I. Describe (in English) the following graphs in $\mathbb{R}^3$: (3 points each, 6 total)

(a) $x = 3$

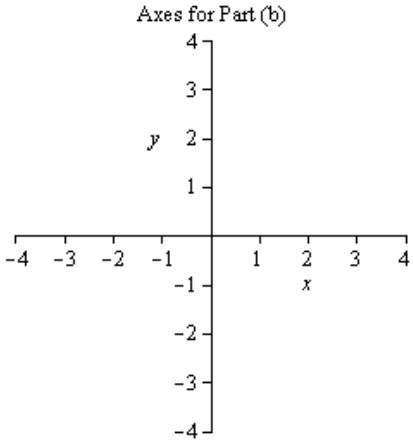
(b) $x^2 + y^2 = 25$

Problem II. Given the vectors $\mathbf{u} = 2\mathbf{i} - 3\mathbf{j}$ and $\mathbf{v} = -3\mathbf{i} + \mathbf{j}$ in $\mathbb{R}^2$ find each of the following and illustrate on the axes provided: (14 points total)

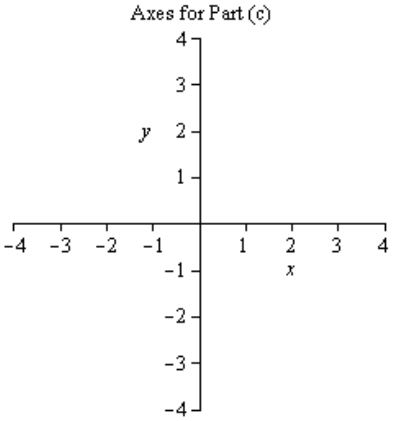
(a) $\mathbf{u} + \mathbf{v}$
(5 points)



(b) $-\frac{2}{3}\mathbf{v}$
(4 points)



(c) $proj_{\mathbf{v}}\mathbf{u}$
(5 points)



Problem III. What is the angle (in degrees) between the vectors $\mathbf{u}$ and $\mathbf{v}$ given in Problem II above? (4 points)

Problem IV. Now consider the vectors $\mathbf{u}$ and $\mathbf{v}$ given in Problem II as vectors in $\mathbb{R}^3$ (i.e. they are both on the *xy* plane). Please answer the following: (6 points total)

(a) Find the magnitude of $\mathbf{u} \times \mathbf{v}$. (3 points)

(b) In which direction does $\mathbf{u} \times \mathbf{v}$ point? (3 points)

Problem V. Please write "true" or "false," according to which is correct, in the blank provided next to each statement. (2 points each, 10 total)

_____ The dot product is a vector in $\mathbb{R}^2$.

_____ The cross product is defined in $\mathbb{R}^2$ and $\mathbb{R}^3$.

_____ The cross product $\mathbf{u} \times \mathbf{v}$ is a vector that is perpendicular to both $\mathbf{u}$ and $\mathbf{v}$.

_____ $\mathbf{k} \times \mathbf{j} = -\mathbf{i}$

_____ $\mathbf{k} \bullet \mathbf{j} = 1$