Math 3160 - Take Home Quiz 1

Name:_____

1. For the following vectors in $\mathbb{R}^3$

$$\mathbf{v_1} = (1, 2, 3), \mathbf{v_2} = (1, 0, -1), \mathbf{v_3} = (4 - 2, 1)$$

   (a) Find the angle between $\mathbf{v_1}$ and $\mathbf{v_2}$.

   (b) Find a vector perpendicular to $\mathbf{v_1}$.

   (c) Find a vector perpendicular to $\mathbf{v_2}$ and $\mathbf{v_3}$.

2. For the following vectors in $\mathbb{R}^5$

$$\mathbf{v_1} = (1, 2, 3, 0, -4), \mathbf{v_2} = (0, 1, 1, 0, -1), \mathbf{v_3} = (4 - 2, 1)$$

   (a) Find the angle between $\mathbf{v_1}$ and $\mathbf{v_2}$.

   (b) Find a vector perpendicular to $\mathbf{v_1}$.

   (c) Find a vector perpendicular to $\mathbf{v_2}$ and $\mathbf{v_3}$. You can't use the cross product here. How would you do this?

3. For the following vectors in $\mathbb{R}^3$

$$\mathbf{a} = (1, 2, 3), \mathbf{b} = (1, 0, -1), P = (4 - 2, 1)$$

   (a) Find the standard equation of the plane that includes the point P and is parallel to $\mathbf{a}$ and $\mathbf{b}$.

   (b) Find the parametric equation of the plane that includes the point P and is parallel to $\mathbf{a}$ and $\mathbf{b}$.

   (c) Find a vector perpendicular to $\mathbf{a}$ and $\mathbf{b}$.