Quiz 3

Name: _____   Section and/or TA: _____

Answer all questions in a clear and concise manner. Unsupported answers will receive *no credit*.

1. (2 points) Consider the points $A(2,1,0)$, $B(-3,1,1)$, and $C(2,0,1)$.

    (a) (1 point) Find a normal vector for the plane through A, B, and C.

    > **Solution:** First calculate two vectors in the plane: $\overrightarrow{AB} = \langle -5,0,1 \rangle$ and $\overrightarrow{AC} = \langle 0,-1,1 \rangle$.
    >
    > A normal vector to the plane is $\overrightarrow{AB} \times \overrightarrow{AC}$.
    >
    > $$\overrightarrow{AB} \times \overrightarrow{AC} = \begin{vmatrix} 0 & 1 \\ -1 & 1 \end{vmatrix} \vec{i} - \begin{vmatrix} -5 & 1 \\ 0 & 1 \end{vmatrix} \vec{j} + \begin{vmatrix} -5 & 0 \\ 0 & -1 \end{vmatrix} \vec{k}$$
    > $$= \vec{i} + 5\vec{j} + 5\vec{k}$$
    > $$= \langle 1,5,5 \rangle$$

    (b) (1 point) Write down an equation for the plane through A, B, and C.

    > **Solution:** Using the normal vector from part (a) the plane has equation
    >
    > $$x + 5y + 5z = d$$
    >
    > Evaluating at point A:
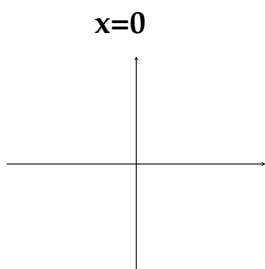   > $$(2) + 5(1) + 5(0) = d$$
    > so $d = 7$, which gives the plane equation as
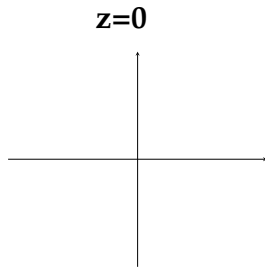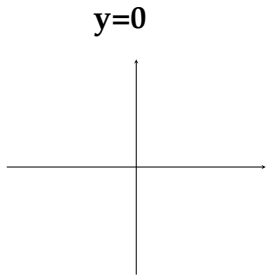   > $$x + 5y + 5z = 7.$$

2. (3 points) Consider the equation of a quadric surface:

    $$y^2 + z^2 - x = 1.$$

    Sketch traces for the surface corresponding to the values $x = 0$, $y = 0$, and $z = 0$. Be sure to label the axes in your sketch.

    x=0

y=0

z=0

Solution:

x=0

y=0

z=0