Math 2110Q  
September 16, 2015  
Quiz 2  

Answer Key  

Find the equation of the plane that contains the points \((1, 2, 1), (2, 4, 4),\) and \((3, -2, 2)\).

**Solution:** We need to find a vector that is normal to the plane, so we’ll find two vectors parallel to the plane and take their cross product.

Let \(\vec{v} = \langle 2 - 1, 4 - 2, 4 - 1 \rangle = \langle 1, 2, 3 \rangle\) (using the points \((1, 2, 1)\) and \((2, 4, 4)\)).

Let \(\vec{w} = \langle 3 - 1, -2 - 2, 2 - 1 \rangle = \langle 2, -4, 1 \rangle\) (using the points \((1, 2, 1)\) and \((3, -2, 2)\)).

Now we compute the normal vector \(\vec{N} = \vec{v} \times \vec{w}\):

\[
\vec{N} = \langle 1, 2, 3 \rangle \times \langle 2, -4, 1 \rangle
\]

\[
= \begin{vmatrix} \vec{i} & \vec{j} & \vec{k} \\ 1 & 2 & 3 \\ 2 & -4 & 1 \end{vmatrix}
\]

\[
= \langle 14, 5, -8 \rangle.
\]

Thus the plane is given by \(14(x - 1) + 5(y - 2) - 8(z - 1) = 0\), which simplifies to \(14x + 5y - 8z = 16\).