Math 281 Homework 2 Name: _____

Complete the following problems on your own paper. If you use notebook paper, please remove the jagged edges of the paper before submitting your homework. Your solutions must be numbered and submitted in the order the problems were given, legibly written using correct notation and including all mathematical details. If you submit work that is messy, disorganized, or lacking detail, you should expect to receive little credit regardless of having the correct final answer.

Due: 8:00am on Tuesday, October 15

1. Determine if the points $A(3,1,2)$, $B(1,-1,1)$, $C(-2,4,3)$, and $D(-3,-5,0)$ are coplanar. That is, determine if the points lie in the same plane.
2. Suppose $\vec{a} \neq \vec{0}$
   (a) True or False : If $\vec{a} \cdot \vec{b} = \vec{a} \cdot \vec{c}$, then $\vec{b} = \vec{c}$. Justify your answer.
   (b) True or False : If $\vec{a} \times \vec{b} = \vec{a} \times \vec{c}$, then $\vec{b} = \vec{c}$. Justify your answer.
   (c) True or False : If $\vec{a} \cdot \vec{b} = \vec{a} \cdot \vec{c}$ and $\vec{a} \times \vec{b} = \vec{a} \times \vec{c}$, then $\vec{b} = \vec{c}$. Justify your answer.
3. (a) Find parametric equations and symmetric equations for the line through the points $P(5,3,1)$ and $Q(7,4,-3)$.
   (b) At what point does the line intersect the xz-plane?
   (c) Where does the line intersect the plane $x - 3y - 2z = 8$?
4. Consider the points $P(2,6,-1)$, $Q(-1,8,-2)$ and $R(3,7,0)$.
   (a) Find a vector orthogonal to the plane containing the points P, Q, and R.
   (b) Find the area of the triangle with vertices P, Q, and R.
   (c) Find the equation of the plane containing the points P, Q, and R.
5. Find the equation of the plane that contains the points $A(2,1,-1)$ and $B(0,-2,4)$ and is perpendicular to the plane $2x - y + 3z = 10$.