Please work the problems in a neat, clear manner. Show enough detail to allow me to follow your solutions; Make it easy for me to grade.

1. Let $\vec{a} = \langle 1, 1, -2\rangle$ and $\vec{b} = \langle 9, 2, -6\rangle$. Find:
   (a) $\vec{a} \cdot \vec{b}$
   (b) $\vec{a} \times \vec{b}$
   (c) $\|\vec{b}\|$
   (d) $\hat{\mathbf{b}}$ (a unit vector in the direction of $\vec{b}$.
   (e) The angle (to the nearest degree) between $\vec{a}$ and $\vec{b}$.
   (f) The area of the parallelogram that can be formed by vectors $\vec{a}$ and $\vec{b}$.
   (g) $\text{proj}_{\vec{a}}\vec{b}$
2. Given vectors $\vec{a}$ and $\vec{b}$ such that $\|\vec{a}\| = 3$, $\|\vec{b}\| = 4$ and $\vec{a} \cdot \vec{b} = 6\sqrt{3}$, find $\|(\vec{a} + 2\vec{b}) \times (3\vec{a} - \vec{b})\|$.
3. Find all values of b such that the vectors $\langle -6, b, 2\rangle$ and $\langle b, b^2, b\rangle$ are orthogonal.
4. Find the parametric and symmetric equations of the line that goes through the point $P(-2, 3, 5)$ and is parallel to the line with vector equation $\vec{r}(t) = \langle 1 - t, 2 + t, -4 - 4t\rangle$.
5. Find an equation ($ax + by + cz = d$) of the plane that contains the point $(-2, 1, 3)$ and is perpendicular to the line through the points $(-2, 1, 3)$ and $(1, 0, -1)$.