Math 116. Fall 2006. Quiz 2 - review problems.

1-review. Find a unit vector $\mathbf{u}$ with the same direction as $\mathbf{b} = 7\mathbf{i} - 2\sqrt{3}\mathbf{j} + 2\sqrt{5}\mathbf{k}$.
Hint:

$$\mathbf{u} = \frac{\mathbf{b}}{|b|}$$

2-review. Let $\mathbf{a} = -2\mathbf{i} + 3\sqrt{12}\mathbf{j} + 3\sqrt{2}\mathbf{k}$, $\mathbf{b} = -3\mathbf{i} + \sqrt{5}\mathbf{j} + \sqrt{2}\mathbf{k}$. Find the angle between these vectors and the vector projection of $\mathbf{b}$ onto $\mathbf{a}$.
Hint:

$$\cos\theta = \frac{\mathbf{a} \cdot \mathbf{b}}{ab}.$$

3-review. Find the equation of the plane, which passes through points $A(-2,\, 1, -3)$, $B(1,\, 1, 1)$, and $C(4,\, 5, -2)$
Hint: consider vectors AB, AC and their cross product to find the normal vector.

4-review. Plane p_1 has the equation $3x - 5y + z = 2$. Plane p_2 passes through point $A(2,\, -1,\, 0)$ and is orthogonal to the line $\dfrac{x-2}{2} = \dfrac{y-1}{1} = \dfrac{z-17}{-1}$. Find the parametric equations of the line $p_1 \cap p_2$ (which is the intersection of planes p_1 and p_2).
Hint: the directional vector of the line is just the cross product of the normal vectors of two planes.

5-review. Find the equation of the tangent line to the curve $\mathbf{r}(t) = -t^2\mathbf{i} + (2t-1)\mathbf{j} + (3-t)\mathbf{k}$ at point $A(-1, 1, 2)$.
Hint: the directional vector of the tangent line is $\mathbf{r}'$.

6-review. Find the arc length of the curve $\mathbf{r}(t) = \langle 2\sqrt{t}, 2, 3\rangle$ if $1 \le t \le 2$.
Hint:

$$L = \int_1^2 |\mathbf{r}'|$$