Homework 2, Graded Problems.

1. Find the equation of the plane through $(1, 4, -2)$ and perpendicular to the line
   \[
   \langle 2, 0, 2 \rangle + t\langle -1, 3, 5 \rangle \]

2. Find the line of intersection between the planes
   \[
   2x - 3y + z = 9 \quad \text{and} \quad x + 3y - 4z = 0
   \]
   Write your answer in parametric form.

3. Find $a$ so that the lines
   \[
   \langle a, 0, 0 \rangle + t\langle 1, 2, -1 \rangle \quad \text{and} \quad \langle 1, 2, 3 \rangle + s\langle 0, 1, -1 \rangle
   \]
   meet in exactly one point. Also find that point.

4. For the parametric curve
   \[
   \mathbf{r}(t) = \cos \frac{\pi(t - 1)}{2} \mathbf{i} + \left(1 + \sin \frac{\pi(t - 1)}{2}\right) \mathbf{j} + t \mathbf{k}
   \]
   (a) Sketch the portion of the curve for $0 \leq t \leq 2$.
   (b) Compute $\mathbf{r}'(1)$.
   (c) Include $\mathbf{r}'(1)$, based at the point $\mathbf{r}(1)$, in your sketch from part (a).