1. Multiple choice. Clearly mark your answer.

   (a) [2 pts] If $\mathbf{u} \times \mathbf{v} = \mathbf{v} \times \mathbf{w}$, then $\mathbf{v} \cdot (\mathbf{u} \times \mathbf{w}) = 0$.

   (i) True.
   (ii) False.

   (b) [2 pts] The two planes $2x + 2y - z = 4$ and $-4x - 4y + 2z = 3$ intersect in a line.

   (i) True.
   (ii) False.

   (c) [2 pts] The line $\mathbf{r}(t) = \langle t + 1, 2t - 1, -3t + 16 \rangle$ is perpendicular to which of the following planes?

   (i) $3z = x + 2(y - 1)$
   (ii) $-x - 2y + 3z = 11$
   (iii) $2x + 4y - 6z = 31$
   (iv) All of them.
   (v) None of them.

   (d) [2 pts] If $\mathbf{u} \times \mathbf{v} = \mathbf{0}$ and $\mathbf{u}$ is not the zero vector, then which of the following is necessarily true?

   (i) $\mathbf{u} \cdot \mathbf{v} = 0$
   (ii) Either $\mathsf{proj}_{\mathbf{u}}\mathbf{v} = \mathbf{v}$ or $\mathsf{proj}_{\mathbf{u}}\mathbf{v} = -\mathbf{v}$
   (iii) $|\mathbf{u}| = |\mathbf{v}|$
   (iv) All of the above.
   (v) None of the above.

2. [4 pts] Find an equation of the plane which passes through the point $(1, 0, 0)$ and which is orthogonal to both planes given below:

$$\begin{cases} x + y + z = 1 \\ x - y - z = 2 \end{cases}$$

3. [4 pts] The intersection of a plane with the cone $S = \{(x, y, z) : x^2 + y^2 - z^2 = 0\}$ is called a **conic section**. What curve do we get? In each row check only one box.

Intersect S with...	hyperbola(s)	parabola(s)	circle(s)	line(s)
$z = 1$ gives...				
$z = x$ gives...				
$z = x + 1$ gives...				
$x = 1$ gives...				

Points earned: ______
out of a possible 8 points