**HW 2**
**Math 261, S19**

Please see the course syllabus for details on how to turn in your homework assignments. This one is due at the beginning of your class on **Friday, Februrary 8**.

1. (5 pts.) True or False
   (a) A line and a plane in $\mathbb{R}^3$ always intersect in a point.
   (b) A line and a plane in $\mathbb{R}^3$ intersect in at most one point.
   (c) A plane $P$ in $\mathbb{R}^3$ and a line in $\mathbb{R}^3$ not completely contained in $P$ intersect in at most one point.
   (d) $\mathbf{r_1}(t) = \langle t, 2t, 3t\rangle$ and $\mathbf{r_2}(t) = \langle 1-t, 2-2t, 3-3t\rangle$ are two parameterizations of the same line.
   (e) $\mathbf{r_1}(t) = \langle t, 0, 0\rangle$ and $\mathbf{r_2}(t) = \langle 0, 0, t\rangle$ are two parameterizations of the same line.
2. (3 pts.) Determine the equation of the plane that passes through points $(0, 1, 0)$, $(-1, 0, 1)$, and $(0, -2, 1)$. Please give your answer in the form

$$\square\, x + \square\, y + \square\, z = 1.$$

3. (3 pts.) Fill in the blanks of the following parameterization of a line through the points $P_1 = (1, 1, 0)$ and $P_2 = (0, 3, 1)$:

$$\begin{cases} x = -1 + t \\ y = \square + \square\, t \\ z = \square + \square\, t \end{cases}$$

4. (3 pts.) The line given by the parameterization

$$\begin{cases} x = 1 + t \\ y = 3t \\ z = 2 - 2t \end{cases}$$

   and the plane given by $x + 2y + z = 8$ intersect in a point. Find that point.

5. (3 pts.) Compute the derivative $\mathbf{r}'(t)$ of vector function $\mathbf{r}(t) = \langle e^t, 3t^2 - 2t + 5, \sin(t)\rangle$.

6. (3 pts.) Suppose a particle moves according to the position function $\mathbf{r}(t) = \langle t^3, t^2, 4t + 1\rangle$. Determine the acceleration $\mathbf{a}(2)$ of the particle at $t = 2$.