Chapter 9 Test

1. a. Determine the point of intersection for the lines having equations $\vec{r} = (4, 2, 6) + s(1, 3, 11), s \in \mathbf{R}$, and $\vec{r} = (5, -1, 4) + t(2, 0, 9), t \in \mathbf{R}$.

   b. Verify that the intersection point of these two lines is on the plane $x - y + z + 1 = 0$.

2. a. Determine the distance from point $A(3, 2, 3)$ to π: $8x - 8y + 4z - 7 = 0$.

   b. Determine the distance between the planes π_1: $2x - y + 2z - 16 = 0$ and π_2: $2x - y + 2z + 24 = 0$.

3. a. Determine the equation of the line of intersection L between the planes π_1: $2x + 3y - z = 3$ and π_2: $-x + y + z = 1$.

   b. Determine the point of intersection between L and the xz-plane.

4. a. Solve the following system of equations:

   ① $x - y + z = 10$

   ② $2x + 3y - 2z = -21$

   ③ $\frac{1}{2}x + \frac{2}{5}y + \frac{1}{4}z = -\frac{1}{2}$

   b. Explain what your solution means geometrically.

5. a. Solve the following system of equations:

   ① $x - y + z = -1$

   ② $2x + 2y - z = 0$

   ③ $x - 5y + 4z = -3$

   b. Explain what your solution means geometrically.

6. The three planes $x + y + z = 0$, $x + 2y + 2z = 1$, and $2x - y + mz = n$ intersect in a line.

   a. Determine the values of m and n for which this is true.

   b. What is the equation of the line?

7. Determine the distance between the skew lines with equations L_1: $\vec{r} = (-1, -3, 0) + s(1, 1, 1), s \in \mathbf{R}$, and L_2: $\vec{r} = (-5, 5, -8) + t(1, 2, 5), t \in \mathbf{R}$.