Problem # 15
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Problem # 16
The vector is in the set. What value of the parameters produces that vector?

a) \( \begin{pmatrix} 5 \\ -5 \end{pmatrix}, \left\{ \begin{pmatrix} 1 \\ -1 \end{pmatrix} k \mid k \in \mathbb{R} \right\} \)

b) \( \begin{pmatrix} 2 \\ 1 \end{pmatrix}, \left\{ \begin{pmatrix} -2 \\ 0 \end{pmatrix} i + \begin{pmatrix} 3 \\ 1 \end{pmatrix} j \mid i, j \in \mathbb{R} \right\} \)

c) \( \begin{pmatrix} -4 \\ 2 \end{pmatrix}, \left\{ \begin{pmatrix} 1 \\ 1 \end{pmatrix} m + \begin{pmatrix} 2 \\ 1 \end{pmatrix} n \mid m, n \in \mathbb{R} \right\} \)

Problem # 17
Intersect these planes:
\( \left\{ \begin{pmatrix} 1 \\ 1 \end{pmatrix} s + \begin{pmatrix} 0 \\ 3 \end{pmatrix} t \mid s, t \in \mathbb{R} \right\} \) and
\( \left\{ \begin{pmatrix} 1 \\ 0 \end{pmatrix} + \begin{pmatrix} 0 \\ 3 \end{pmatrix} k + \begin{pmatrix} 2 \\ 4 \end{pmatrix} m \mid k, m \in \mathbb{R} \right\} \)

Problem # 18
Find the equation of the line which passes through the intersection of the pair of lines and satisfies the other given condition.

a) \( 3x + y - 2 = 0, x + 5y - 4 = 0 \); through \((5, 2)\)
b) \( 3x - 4y - 2 = 0, 3x + 4y + 1 = 0 \); intercepts are equal.

Problem # 19
The points \( A(1, -2, 3), B(-4, 5, 6) \) and \( C(5, 7, 0) \) are vertices of a triangle. Express the sides as vectors and find the length of each side.

Problem # 20
Compute the distance of the point \( P \) from the line \( \ell \)

a) \( P(-1, 5), \ell = \left\{ \bar{x} \in \mathbb{R}^2 \text{ s.t. } \bar{x} - \begin{pmatrix} 1 \\ 2 \end{pmatrix} \cdot \begin{pmatrix} -5 \\ 12 \end{pmatrix} = 0 \right\} \)

b) \( P(7, 9), \ell = \left\{ \begin{pmatrix} 9 \\ -5 \end{pmatrix} + \lambda \begin{pmatrix} -4 \\ 3 \end{pmatrix} \mid \lambda \in \mathbb{R} \right\} \).

Problem # 21
Compute the area of the triangle \( ABC \).
\( A(1, 2), B(8, -1), C(6, 5) \).