6.1 Equations of Lines in Two-Space Worksheet

This document was composed and formatted by Annie Bernatchez.

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1) Write a vector equation for a line given each direction vector $\vec{m}$ and point P_0.

a) $\vec{m} = [2, -7]$, $P_0(9, 4)$	b) $\vec{m} = [-1, 5]$, $P_0(3, 7)$

2) Write the vector equation of the line that passes through each pair of points.

a) $A(2, 3)$, $B(7, 1)$	b) $A(5, -1)$, $B(-2, 7)$

3) Write the parametric equations for each vector equation.

a) $[x, y] = [7, 3] + t[2, 5]$	b) $[x, y] = [-1, 4] + t[8, -9]$

4) Determine if each point P is on the line $[x, y] = [3, 1] + t[-2, 5]$

a) $P(12, 36)$	b) $P(-7, 26)$
c) $P(1, 6)$	d) $P(-3, 15)$

5) Write a vector equation for each line, given the parametric equations.

a) $\ell : \begin{cases} x = 2 - 4t \\ y = 1 - 5t \end{cases}$	b) $\ell : \begin{cases} x = 8 - 9t \\ y = 3 \end{cases}$

6) Given each set of parametric equations, write the scalar equation.

a) $\ell : \begin{cases} x = 3 + 4t \\ y = -1 - 5t \end{cases}$	b) $\ell : \begin{cases} x = 2 + 8t \\ y = -5 + 7t \end{cases}$

7) Write the scalar equation of each line given the normal vector $\vec{n}$ and point P_0.

a) $\vec{n} = [4, 1]$, $P_0(3, -5)$	b) $\vec{n} = [1, -3]$, $P_0(4, 3)$

8) Determine the vector equation of each line.

a) parallel to the y-axis and through $P_0(2, -7)$

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b) parallel to $[x, y] = [3, -1] + t[3, 4]$ and through $P_0(-2, 4)$

c) perpendicular to $[x, y] = [2, -1] + t[5, 3]$ with x-intercept 3

9) Given each scalar equation, write a vector equation and the parametric equations.

a) $x + 2y = 6$	b) $5x - 2y = 13$

10) In each case, determine if ℓ_1 and ℓ_2 are parallel, perpendicular, or neither. Explain.

a) $\ell_1 : 4x - 6y = 9$

$\ell_2 : [x, y] = [6, 3] + t[3, 2]$

b) $\ell_1 : x + 9y = 2$

$\ell_2 : \begin{cases} x = t \\ y = 15 + 9t \end{cases}$

Answer Key

1. a) $[x, y] = [9, 4] + t[2, -7]$ b) $[x, y] = [3, 7] + t[-1, 5]$

2. a) $[x, y] = [2, 3] + t[5, -2]$ b) $[x, y] = [5, -1] + t[-7, 8]$

3. a) $\ell : \begin{cases} x = 7 + 2t \\ y = 3 + 5t \end{cases}$ b) $\ell : \begin{cases} x = -1 + 8t \\ y = 4 - 9t \end{cases}$

4. a) No b) Yes c) Yes d) No

5. a) $[x, y] = [2, 1] + t[-4, -5]$ b) $[x, y] = [8, 3] + t[-9, 0]$

6. a) $5x + 4y - 11 = 0$ b) $-7x + 8y + 54 = 0$

7. a) $4x + y - 7 = 0$ b) $x - 3y + 5 = 0$

8. a) $[x, y] = [2, -7] + t[0, 1]$ b) $[x, y] = [-2, 4] + t[3, 4]$ c) $[x, y] = [3, 0] + t[-3, 5]$

9. a) $[x, y] = [2, 2] + t[-2, 1]$; $x = 2 - 2t$, $y = 2 + t$ b) $[x, y] = [3, 1] + t[2, 5]$; $x = 3 + 2t$, $y = 1 + 5t$

10. a) parallel b) perpendicular

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