8.1 Equations of Lines and Planes in R^2

These problems taken from the Nelson Text: Pg. 433 – 434

3. Identify the direction vector and a point on each of the following lines:
   a. $\vec{r} = (3, 4) + t(2, 1), t \in \mathbf{R}$
   b. $x = 1 + 2t,\ y = 3 - 7t,\ t \in \mathbf{R}$
   c. $\vec{r} = (4, 1 + 2t),\ t \in \mathbf{R}$
   d. $x = -5t, y = 6, t \in \mathbf{R}$

5. A line is defined by the parametric equations $x = -2 - t$ and $y = 4 + 2t, t \in \mathbf{R}$.
   a. Does $R(-9, 18)$ lie on this line? Explain.
   b. Write a vector equation for this line using the given parametric equations.

9. A line passes through the points $M(4, 5)$ and $N(9, 5)$.
   a. Sketch this line.
   b. Determine vector and parametric equations for this line.

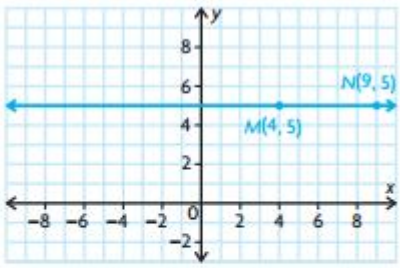
10. For the line $L: \vec{r} = (1, -5) + s(3, 5), s \in \mathbf{R}$, determine the following:
   a. an equation for the line perpendicular to L, passing through $P(2, 0)$
   b. the point at which the line in part a. intersects the y-axis

Answers

3. Answers may vary. For example:
a. direction vector: (2, 1); point: (3, 4)
b. direction vector: (2, −7); point: (1, 3)
c. direction vector: (0, 2); point: (4, 1)
d. direction vector: (−5, 0); point: (0, 6)

5. **a.** $R(-9, 18)$ is a point on the line. When $t = 7, x = -9$ and $y = 18$.
b. Answers may vary. For example: $\vec{r} = (-9, 18) + t(-1, 2), t \in \mathbf{R}$

9. **a.**



b. $\vec{r} = (4, 5) + t(5, 0), t \in \mathbf{R}$; $x = 4 + 5t, y = 5, t \in \mathbf{R}$

10. **a.** $\vec{r} = (2, 0) + t(5, -3), t \in \mathbf{R}$
b. (0, −1.2)