Parallel Lines

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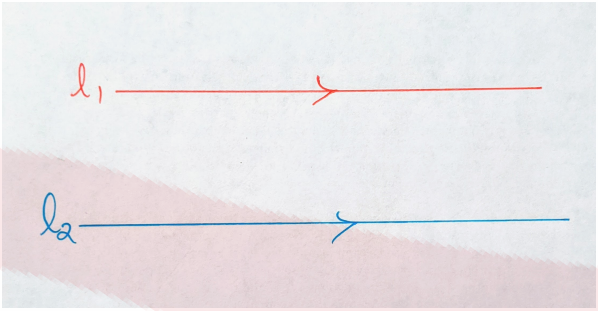
What are parallel lines?

I think of parallel lines as two roads that run side by side forever with the same distance between them forever.



l_1 and l_2 are parallel lines. Parallel lines have the same slope but different y-intercepts. This means,

$$m_1 = m_2 \text{ but } b_1 \neq b_2$$

where the equations of l_1 and l_2 are given by,

$$\begin{aligned} l_1 &: y = m_1 x + b_1 \\ l_2 &: y = m_2 x + b_2 \end{aligned}$$

Exercises

1. Write an equation of a line parallel to the lines below.

   a) $y = 3x$

   b) $-2x + 2$

   c) $y = \frac{1}{4}x - 1$

   d) $y = -\frac{3}{5}x$

   e) $y = 5x + 6$

2. Determine if the pairs of lines below are parallel or not.

   a) $y = \frac{2}{3}x + \frac{1}{2}$ and $y = 6x - 1$

   b) $y = -4x + \frac{3}{5}$ and $y = -4x + \frac{1}{5}$

   c) $y = \frac{1}{3}x - 2$ and $y = \frac{7}{2}x$

   d) $y = 5x + 1$ and $y = 5x + 2$

   e) $y = -x - 5$ and $y = -x$