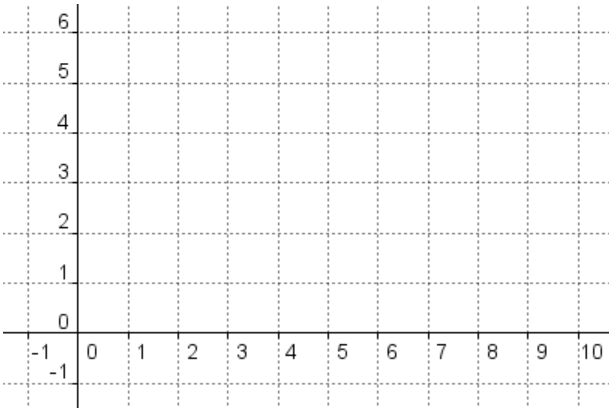
Parallel Lines

So far, we have solved linear systems that have one solution (point of intersection).

Today, we will investigate two other kinds of linear systems.

Example – Solve the following linear system algebraically and graphically. Then write a conclusion about this kind of linear system.

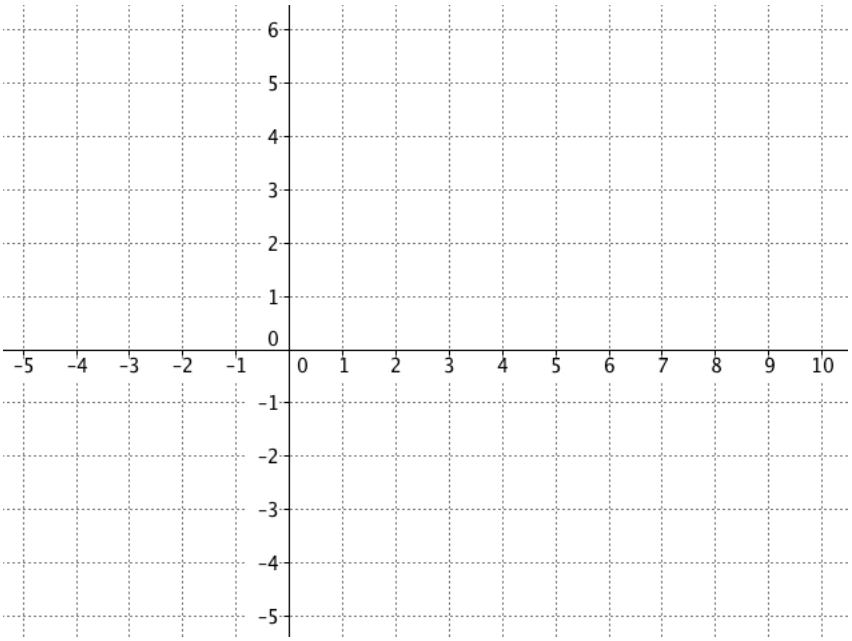
$$y = -\frac{2}{3}x + 5 \quad \text{and} \quad 2x + 3y = 15$$



Conclusion:

Example – Solve the following linear system algebraically and graphically. Label the slope of each line on the graph. Then write a conclusion about this kind of linear system.

$$y = -\frac{3}{5}x - 2 \quad \text{and} \quad 3x + 5y = 30$$

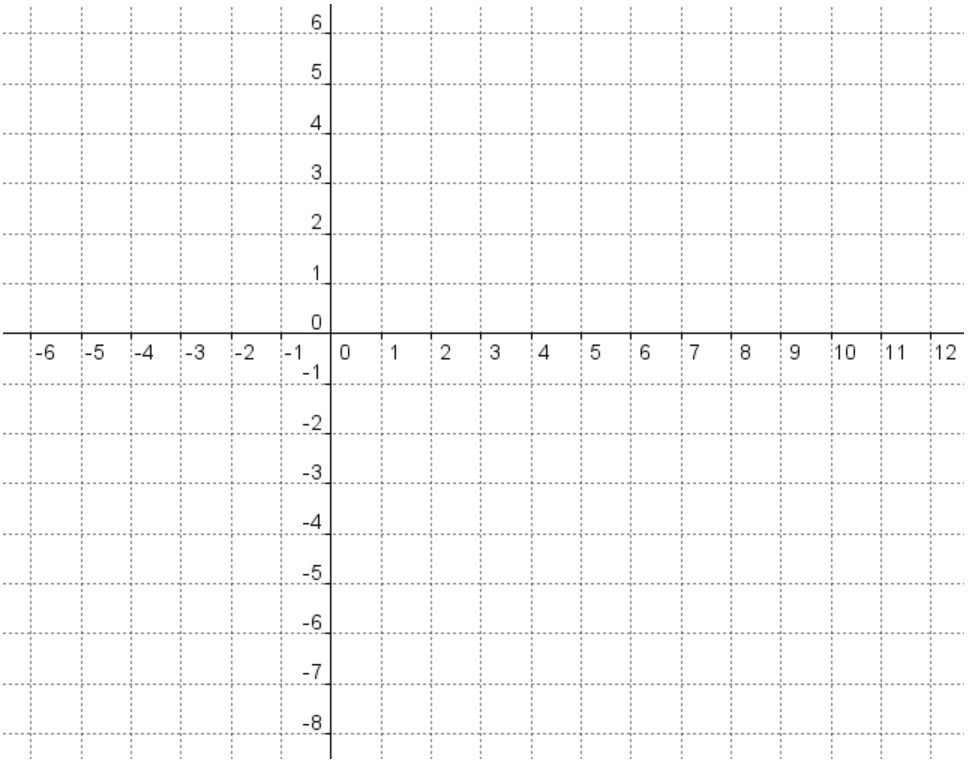


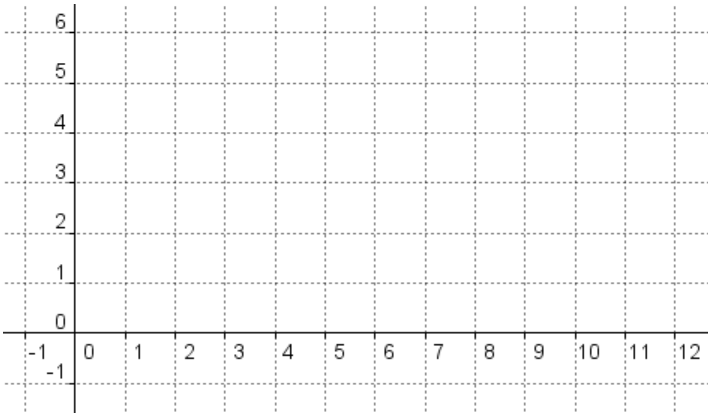
Conclusion:

An important application of linear systems is determining the shortest distance between lines. We will do this graphically before we solve problems algebraically.

Example – Graph the following lines accurately and label the slope of each line. Then determine the shortest distance between the lines.

$$y = \frac{2}{3}x - 7 \quad \text{and} \quad 2x - 3y = -8$$

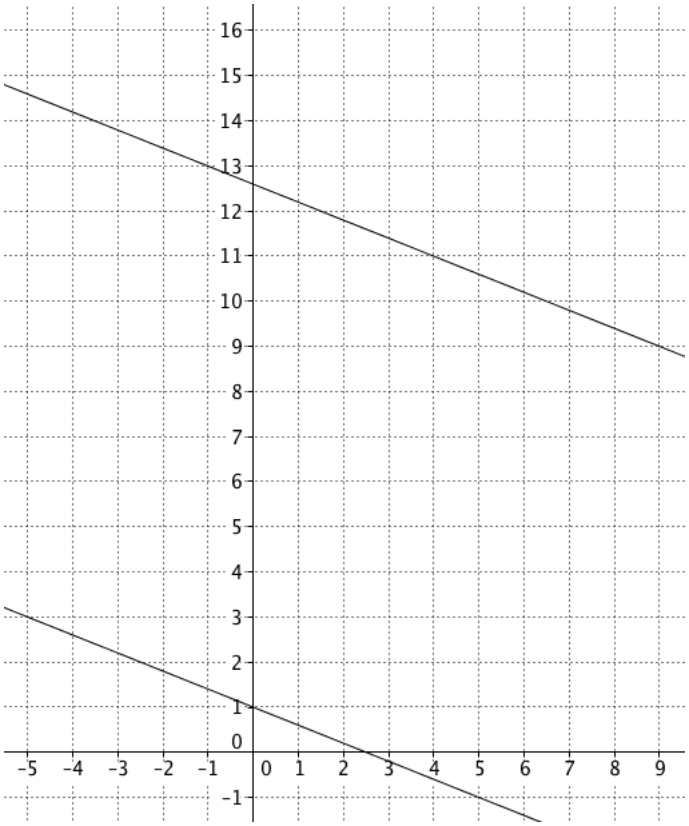




We can illustrate the shortest distance between two lines by drawing a line segment that is perpendicular to both lines.

Example – Draw a line segment to represent the shortest distance between the lines in the following graph. Then determine:

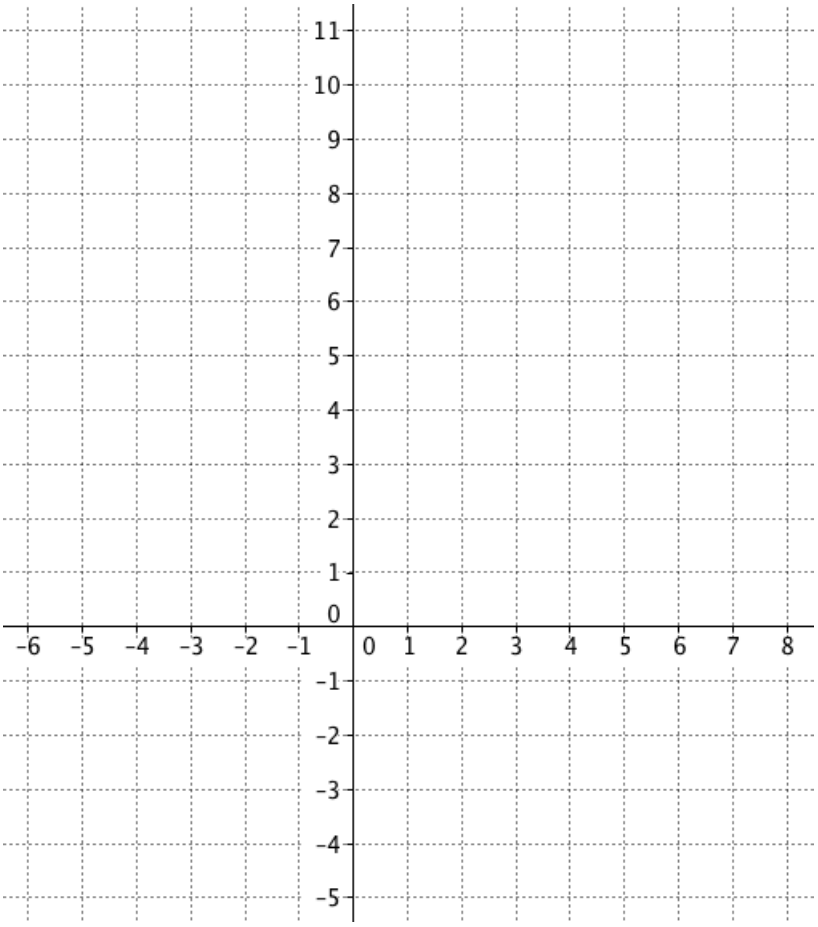
a) the slope of the line segment
b) the length of the line segment
c) the equation of the line segment



Homework – Please solve the following problems.

1. Graph the following lines accurately and label the slope of each line. Then determine the shortest distance between the lines.

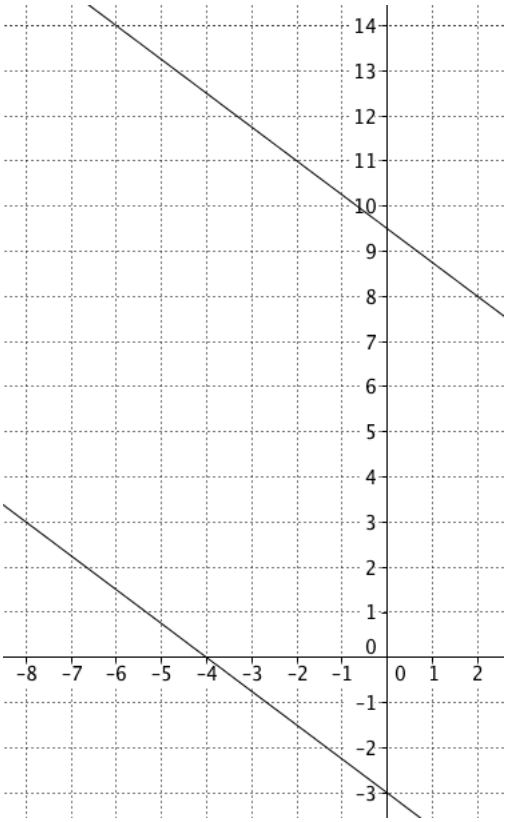
$$y = -\frac{3}{2}x + 8 \quad \text{and} \quad 3x + 2y = -10$$



2. Draw a line segment to represent the shortest distance between each pair of lines. Then determine:

a) the slope of the line segment
b) the length of the line segment
c) the equation of the line segment

i)



ii)