

Ninth Set of Homework for Math 05

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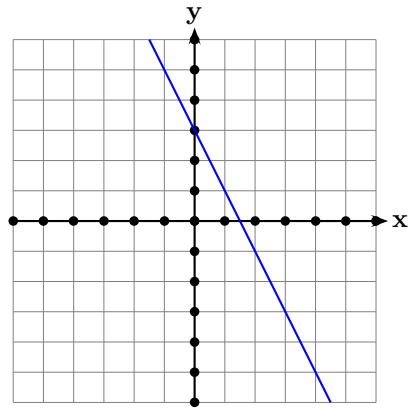
Please note: You should fully justify your answers.

1 Finding equations of lines

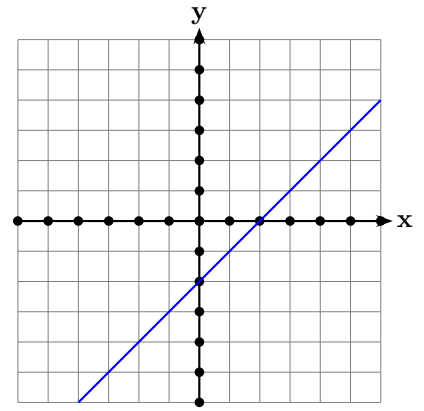
- Find an equation of the line that:
 - has slope -2 and y -intercept 11 .
 - has slope $-\frac{5}{2}$ and y -intercept 0 .
 - has slope $\frac{3}{4}$ and passes through the point $(0, -4)$
 - has the same slope as $2y - 4x = 10$ and the same y -intercept as $y = 5x - 3$.
 - has slope -5 and passes through the point $(-2, 3)$.
 - has slope 0 and passes through the point $(3, 5)$.
 - is vertical and passes through the point $(-3, 0)$.
 - passes through the points $(-5, 13)$ and $(1, -5)$.
 - passes through the points $(-2, 4)$ and $(1, 7)$.
 - passes through the points $(3, 0)$ and $(6, 2)$.
 - passes through the points $(-1, 5)$ and $(-1, -3)$.
 - passes through $(0, 0)$ and $(3, -5)$.
 - passes through the points $(2, 4)$ and $(-3, 4)$.
 - passes through the points $(0, 4)$ and $(-5, 0)$.
 - passes through the points $\left(\frac{2}{3}, -\frac{1}{9}\right)$, and $\left(-\frac{15}{2}, -\frac{6}{5}\right)$.
 - has the same slope as $3x - 5y = -2$ and the same x -intercept as $-2x - 3y = 6$.
 - has the same x -intercept as $-2x + 3y = -2$ and the same y -intercept as $x - y = 3$.
- Find the equations for each of the lines in Figure 1.

2 Parallel lines, Perpendicular lines

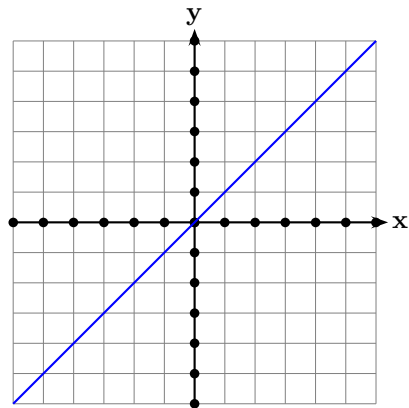
- For each of the following pairs of lines, decide whether they are parallel, perpendicular or neither.
 - $y = 3x - 4$, $y = -3x + 2$
 - $y = \frac{2}{3}x$, $y = -\frac{3}{2}x + 9$
 - $2x - 3y = 7$, $2x - 3y = 5$
 - $3x + y = -2$, $-2x + 3y = 0$
 - $-5x + 2y = 8$, $2x + 5y = -3$
 - $y = 3x + 8$, $3x + y = -3$
 - $y = 2x - 7$, $y = 2x + 9$
 - $y = 5x - 7$, $y = -\frac{x}{5} + 9$



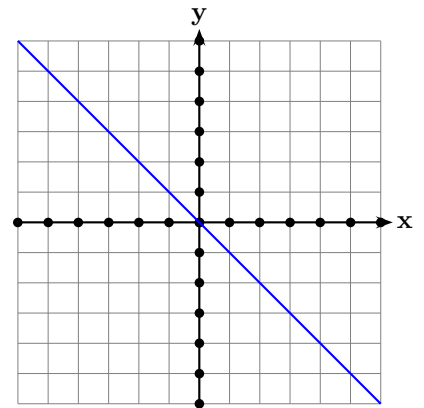
(a)



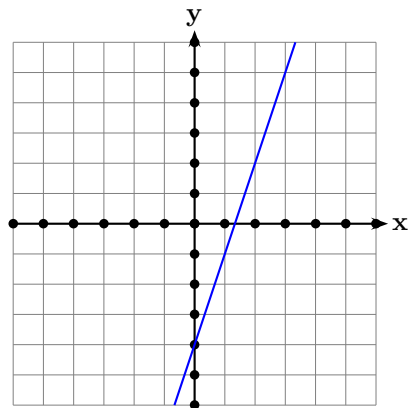
(b)



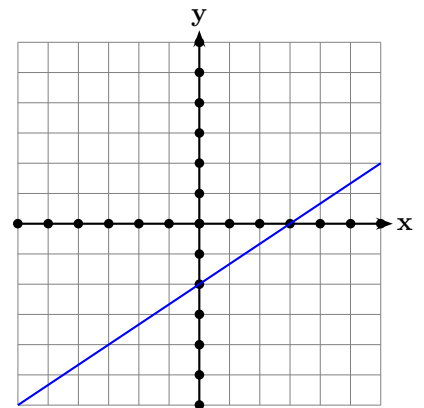
(c)



(d)



(e)



(f)

Figure 1: The lines of Question 2

(i) $2x + 3y - 9 = 0$, $y = -\frac{2x}{3} - 2$

2. Find an equation for the line that:

(a) passes through $(-1, 3)$ and is parallel to the line $y = 3x - 5$.

(b) is parallel to $2x - 5y = 6$ and passes through $(1, -2)$.

(c) is parallel to $x = -3$ and passes through $(5, 9)$.

(d) is perpendicular to $x = 2$ and passes through $(3, 4)$.

(e) is perpendicular to $y = -\frac{x+2}{3}$ and passes through $(0, -2)$.

(f) passes through the point $(3, 2)$ and is perpendicular to $2x - 3y = 5$.

(g) has the same y -intercept as $3x - 4y = 8$ and is parallel to $y = -5x + 11$.

3. Verify that the following four points are the corners of a parallelogram.

$$P(-4, -9), Q(-2, -3), R(-4, -7), S(-6, -13)$$

4. Verify that the following three points are the corners of a right triangle.

$$A(2, 4), B(0, 0), C(4, 3)$$

5. Verify that the following four points are the corners of a rectangle.

$$A(1, 1), B(4, 4), C(-1, 3), D(2, 6)$$

6. Consider again a line l with equation in standard form

$$Ax + By + C = 0$$

where A, B, C are real numbers and at least one of A, B is non-zero.

(a) Prove that a line with equation

$$Ax + By + D = 0$$

where D is any number, is parallel to l .

(b) Prove that a line with equation

$$Bx - Ay + D = 0$$

where D is any number, is perpendicular to l .