1. From \((-2,5)\) to \((2,-4)\):
   \[ \Delta x = 2 - (-2) = 4 \quad \Delta y = -4 - 5 = -9 \]

   Distance = \((\Delta x)^2 + (\Delta y)^2)^{1/2} = (4^2 + 9^2)^{1/2} = 9\sqrt{7} \]
   Midpoint = \((\text{average of the } x\text{s}, \text{average of the } y\text{s}) = (\frac{-2 + 2}{2}, \frac{5 + (-4)}{2}) = (0, \frac{1}{2}) \]

2. \(3x + 4y = 9\)  
   Slope is \(-\frac{3}{4}\)
   \[3\cdot 0 + 4y = 9 \iff \text{when } x=0, y = \frac{9}{4} \text{ (y-intercept)}\]
   \[3x + 4\cdot 0 = 9 \iff \text{when } y=0, x = 3 \text{ (x-intercept)}\]
   These two intercepts are sufficient to draw the graph

3. \(x^2 + y^2 - 2x - 10y + 17 = 0\)
   \[x^2 - 2x + y^2 - 10y = -17\]
   \[x^2 - 2x + 1 + y^2 - 10y + 25 = -17 + 1 + 25\]
   \[(x - 1)^2 + (y - 5)^2 = 9\]
   This is the equation of a circle with center at \((1,-5)\), and radius 3

With center \((-1,1)\), a circle passing through \((4,-11)\) must have radius \(\sqrt{((-1) - 4)^2 + (1 - (-11))^2} = 13\)

So an equation for this circle is:
   \[(x - (-1))^2 + (y - 1)^2 = 13^2\]
   Or
   \[x^2 + y^2 + 2x - 2y - 167 = 0\]

4. a. parallel to the line \(6x + 4y = 3\), passing through the point \((6,1)\).
   Any line of the form \(6x + 4y = K\) is parallel to the line above (in fact \(3x + 2y = K\) is too).
   When \(x = 6, y = 1\), so:
   \[6\cdot 6 + 4\cdot 1 = 40\] (finds \(K\) for us...)
   \[6x + 4y = 40\]
Of course you can also work strictly within the “safety” of the slope-intercept form:

\[ 6x + 4y = 3 \implies y = \frac{-3}{2}x + \frac{3}{4} \]

Our new line is \[ y = \left(\frac{3}{4}\right)x + b \] ...where \[ 1 = \left(\frac{3}{2}\right)6 + b \implies b = 10 \]

So the equation is: \[ y = \left(\frac{-3}{2}\right)x + 10 \]

b. perpendicular to the line \[ 4x + 3y = 1 \], passing through the point (5,0).

Any line of the form \[ 3x - 4y = K \] is perpendicular to the given line.

Passing through (5,0) says \[ 3\cdot5 - 4\cdot0 = K \] ... so \[ K = 15 \].

Again, you can work with the slope-intercept form of the line:

\[ 4x + 3y = 1 \implies y = \left(-\frac{4}{3}\right)x + \frac{1}{3} \]

Our new line is \[ y = \left(\frac{3}{4}\right)x + b \] where \[ 0 = \left(\frac{3}{4}\right)5 + b \implies b = \frac{15}{4} \]

So the equation is: \[ y = \left(\frac{3}{4}\right)x + \frac{15}{4} \]

c. having x-intercept 6 and y-intercept 5.

When \( y \) is 0, \( x \) is 6; when \( x=0, \ y = 5 \) so I see: \( 5x + 6y = 30 \).

Picture the intercepts, (0,5) and (6,0)... Clearly the slope is \(-5/6\),

So \[ y = \left(-\frac{5}{6}\right)x + b \]

and since \( b \) is the y-intercept, \[ Y = \left(-\frac{5}{6}\right)x + 5 \]

5. The manager of a furniture factory finds that it costs \$2000 to manufacture 100 chairs in a day, and \$5400 to produce 300 chairs in a day.

a. Assuming that the relationship between cost and the number of chairs produced is linear, we merely need find the equation of a line through \((n=100, C=\$2000)\) and \((n=300, C = \$5400)\). Equation is shown at part c.

\[ \text{Slope} = \Delta C / \Delta n = (\$5400 - \$2000) / (300-100) = \$3400 / 200 = \$17 \]

b. What is the slope of the line in part (a) and what does it represent?

\$17/chair ... the units tell the story.

Slope here is the marginal cost of producing each additional chair.

c. What is the y-intercept of this line, and what does it represent?

To find the y-intercept we substitute (as in above problems): \$2000 + \$17(100) + b and see that \( b \) must be \$300.

The equation is: \[ \text{Cost} = \$17/chair (n chairs) + \$300. \]

\$300 is the cost to produce 0 chairs, the “fixed cost” of being in this particular business.