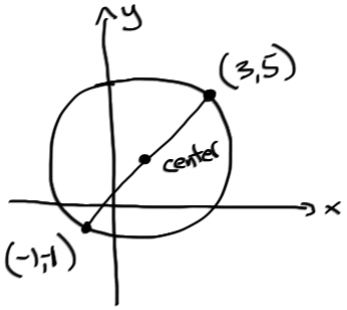
Questions

1. Determine the distance between $(1+\sqrt{2},-2)$ and $(1-\sqrt{2},2)$ as well as the midpoint of the line segment joining the two points.

2. Determine the center and radius of the circle $x^2-3x+y^2+2y=3/4$, then sketch the graph of the circle.

3. Write the standard equation for the circle:



4. Show the points $A(-4,-5)$m $B(1,1)$, and $C(6,7)$ are colinear.

Hint: Colinear means lie of the same line, so if this is true what must the relationship be between the distances AB, BC and AC?

Solutions

1. Determine the distance between $(1+\sqrt{2},-2)$ and $(1-\sqrt{2},2)$ as well as the midpoint of the line segment joining the two points.

Distance between $(1+\sqrt{2},-2),(1-\sqrt{2},2)$:

$$d=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$$
$$=\sqrt{(1-\sqrt{2}-1-\sqrt{2})^2+(2-(-2))^2}$$
$$=\sqrt{(-2\sqrt{2})^2+(4)^2}$$
$$=\sqrt{4\cdot 2+16}$$
$$=\sqrt{24}$$

Midpoint:

$$\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)=\left(\frac{1+\sqrt{2}+1-\sqrt{2}}{2},\frac{-2+2}{2}\right)$$
$$=(1,0)$$

2. Determine the center and radius of the circle $x^2-3x+y^2+2y=3/4$, then sketch the graph of the circle.

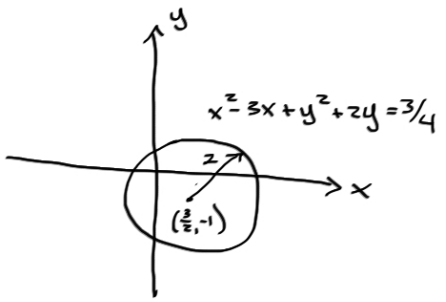
Complete the square in x and y.

$$\underbrace{x^2-3x+\frac{9}{4}}-\frac{9}{4}+\underbrace{y^2+2y+1}-1=\frac{3}{4}$$

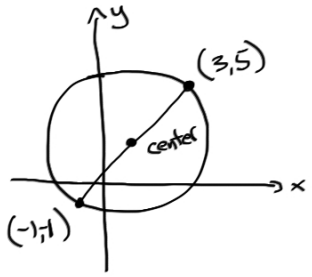
↑ perfect squares! → Move $-\frac{9}{4}-1$ to RHS.

$$\left(x-\frac{3}{2}\right)^2+(y+1)^2=\frac{3}{4}+\frac{9}{4}+1$$
$$=2^2$$

Center $(3/2,-1)$ radius 2.



3. Write the standard equation for the circle:



Center is at midpoint between $(-1,-1)$ and $(3,5)$.

$$\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)=\left(\frac{2}{2},\frac{4}{2}\right)$$
$$=(1,2)$$

Center $(h,k)=(1,2)$

Radius is distance from center to $(3,5)$ or $(-1,-1)$:

$$r=\sqrt{(1-3)^2+(2-5)^2}$$
$$=\sqrt{4+9}$$
$$=\sqrt{13}$$

standard form for circle $(x-h)^2+(y-k)^2=r^2$

$$(x-1)^2+(y-2)^2=13$$

4. Show the points $A(-4,-5)$m $B(1,1)$, and $C(6,7)$ are colinear.

Hint: Colinear means lie of the same line, so if this is true what must the relationship be between the distances AB, BC and AC?

If A, B, C are colinear, then $AB + BC = AC$. It must look like A — B — C not 

$AB = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$ distance formula

$= \sqrt{(-4-1)^2 + (-5-1)^2}$

$= \sqrt{25 + 36}$

$= \sqrt{61}$

$BC = \sqrt{(1-6)^2 + (1-7)^2}$

$= \sqrt{25 + 36}$

$= \sqrt{61}$

$AC = \sqrt{(-4-6)^2 + (-5-7)^2}$

$= \sqrt{100 + 144}$

$= \sqrt{244}$

$= 2\sqrt{61}$

Since $AB + BC = AC$, the points are colinear.