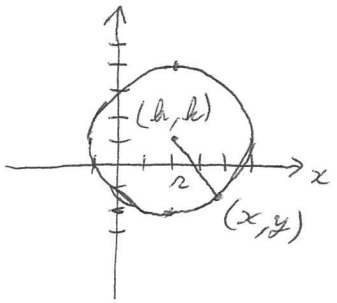
section 11.1

In order to minimize formulas, it is best to start with the Equation of a Circle in Standard Form.

$$(x-h)^2+(y-k)^2=r^2$$

where its center: (h,k)

radius: r



Note: if we let $a=(x-h)$ and $b=(y-k)$ then the formula above becomes Pythagorean Theorem.

$$a^2+b^2=r^2$$

---

for distance formula, let one point be (x,y) other point be (h,k) and solve for r (use only positive, +, solution of r).

Midpoint Formula

given 2 endpoints (x_1,y_1) and (x_2,y_2), the midpoint is

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

---

pay extra attention when completing square is used. especially in section 11.3.

18) center: $(0,0)$ radius: 9

$(x-(0))^2+(y-(0))^2=(9)^2$

$x^2+y^2=81$

20) center: $(0,0)$ radius: $\sqrt{5}$

$(x-(0))^2+(y-(0))^2=(\sqrt{5})^2$

$x^2+y^2=5$

22) radius: 10 center: $(-2,6)$

$(x-(-2))^2+(y-(6))^2=(10)^2$

$(x+2)^2+(y-6)^2=100$

24) radius: 1.5 center: $(-5.5,-6.5)$

$r=\frac{3}{2}$ $(h,k)=(\frac{-10}{2},\frac{-13}{2})$

$(x-(\frac{-10}{2}))^2+(y-(\frac{-13}{2}))^2=(\frac{3}{2})^2$

$(x+\frac{10}{2})^2+(y+\frac{13}{2})^2=\frac{9}{4}$

26) center: $(6,-6)=(h,k)$ point: $(2,-3)=(x,y)$

$((2)-(6))^2+((-3)-(-6))^2=r^2$

$(-4)^2+(3)^2=r^2$

$16+9=r^2$

$25=r^2$

$(x-(6))^2+(y-(-6))^2=25$

$(x-6)^2+(y+6)^2=25$

28) center: $(-5,6)=(h,k)$ point: $(-2,3)=(x,y)$

$((-2)-(-5))^2+((3)-(6))^2=r^2$

$(3)^2+(-3)^2=r^2$

$9+9=r^2$

$18=r^2$

$(x-(-5))^2+(y-(6))^2=18$

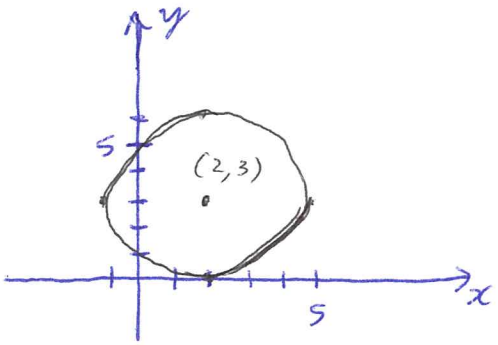
$(x+5)^2+(y-6)^2=18$

30) $(x-2)^2+(y-3)^2=9$

$(x-(2))^2+(y-(3))^2=(3)^2$

center: $(2,3)$

radius: $r=3$



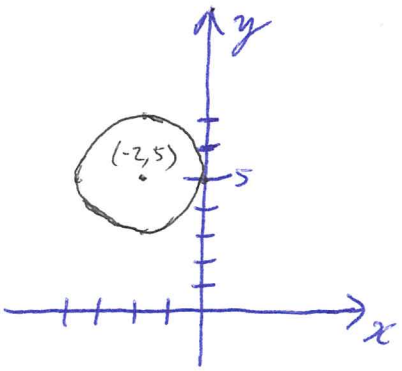
---

32) $(x+2)^2+(y-5)^2=4$

$(x-(-2))^2+(y-(5))^2=(2)^2$

center: $(-2,5)$

radius: $r=2$



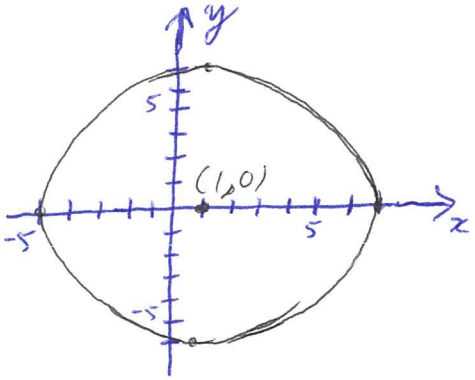
---

34) $(x-1)^2+y^2=36$

$(x-(1))^2+(y-(0))^2=(6)^2$

center: $(1,0)$

radius: $r=6$



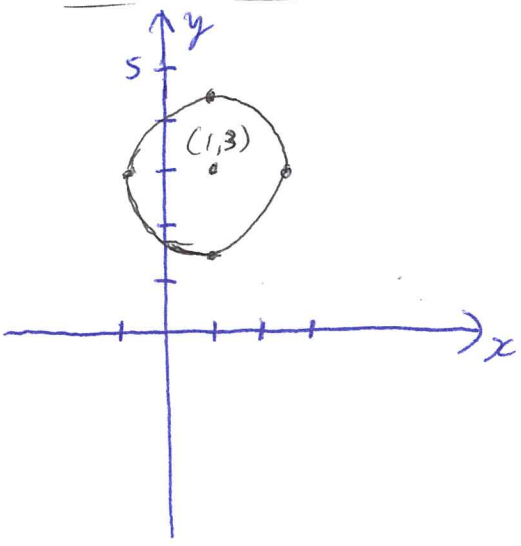
---

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

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

center: $(1,3)$

radius: $r=\frac{3}{2}$

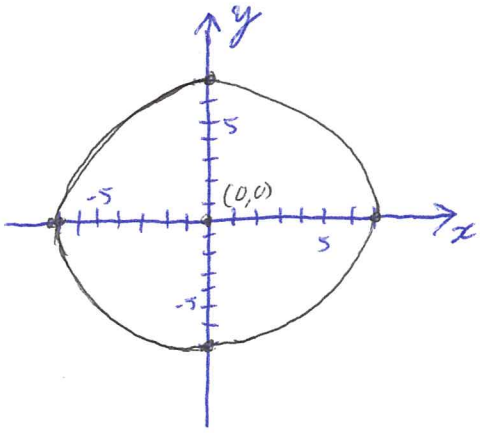


38) $x^2+y^2=49$

$(x-(0))^2+(y-(0))^2=(7)^2$

center: $(0,0)$

radius: $r=7$



40) $6x^2+6y^2=216$

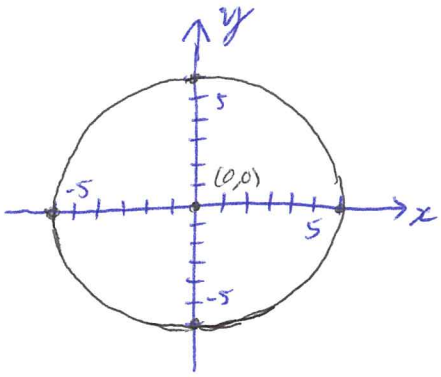
$\frac{6x^2}{6}+\frac{6y^2}{6}=\frac{216}{6}$

$x^2+y^2=36$

$(x-(0))^2+(y-(0))^2=(6)^2$

center: $(0,0)$

radius: $r=6$



42) $x^2+y^2-6x-8y=0$

$x^2-6x+y^2-8y=0$

$\frac{b_y}{2}=\frac{-8}{2}=-4$ $\left(\frac{b_y}{2}\right)^2=(-4)^2=16$

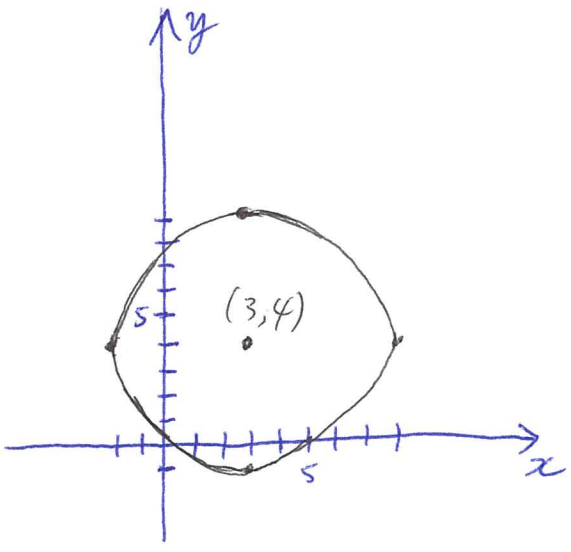
$\frac{b_x}{2}=\frac{-6}{2}=-3$ $(x^2-6x+9)+(y^2-8y+16)=0+(9)+(16)$

$\left(\frac{b_x}{2}\right)^2=(-3)^2=9$ $(x-3)^2+(y-4)^2=25$

$(x-(3))^2+(y-(4))^2=(5)^2$

center: $(3,4)$

radius: $r=5$



44) $x^2+y^2+12x-14y+21=0$

$\frac{b_x}{2}=\frac{12}{2}=6$ $\quad \left(\frac{b_x}{2}\right)^2=(6)^2=36$

$\frac{b_y}{2}=\frac{-14}{2}=-7$ $\quad \left(\frac{b_y}{2}\right)^2=(-7)^2=49$

$x^2+12x+y^2-14y=-21$

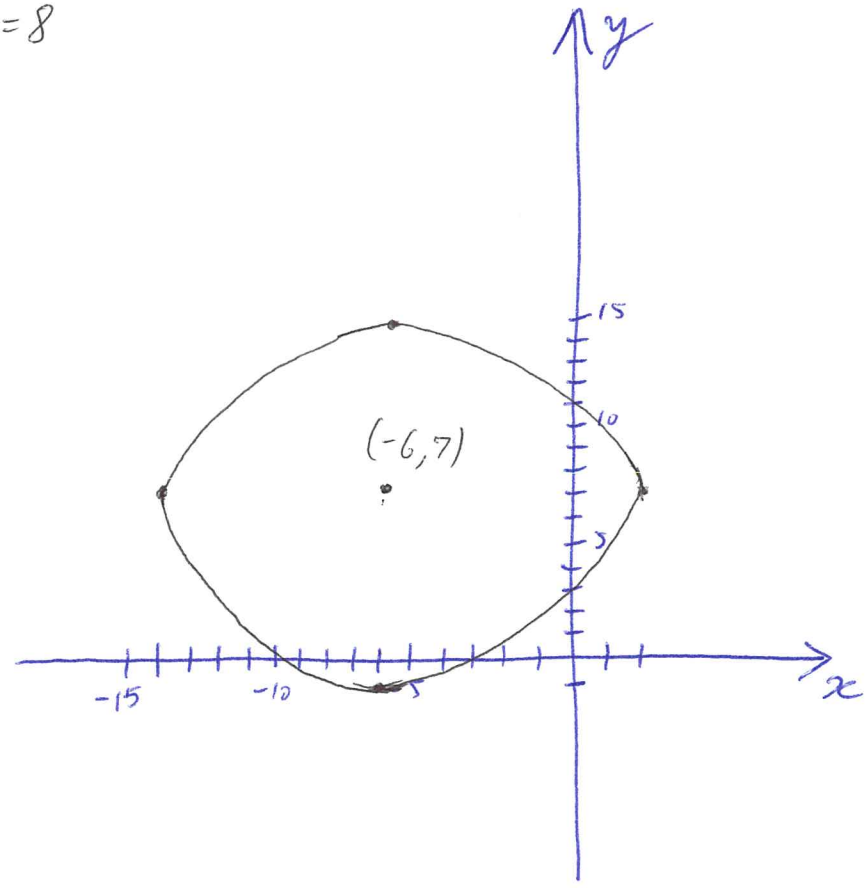
$(x^2+12x+36)+(y^2-14y+49)=-21+(36)+(49)$

$(x+6)^2+(y-7)^2=64$

$(x-(-6))^2+(y-(7))^2=(8)^2$

center: $(-6,7)$

radius: $r=8$



46) $x^2+y^2-10y=0$

$\frac{b_y}{2}=\frac{-10}{2}=-5$ $\left(\frac{b_y}{2}\right)^2=(-5)^2=25$

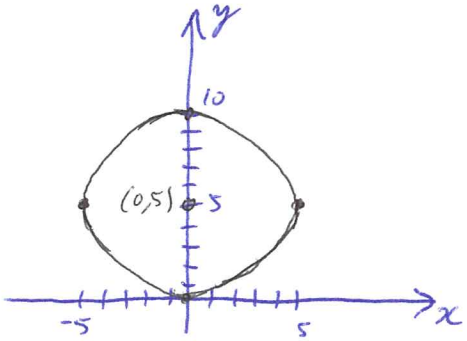
$x^2+(y^2-10y+25)=0+(25)$

$x^2+(y-5)^2=25$

$(x-(0))^2+(y-(5))^2=(5)^2$

center: $(0,5)$

radius: $r=5$



---

48) $x^2+y^2-14x+13=0$

$\frac{b_x}{2}=\frac{-14}{2}=-7$ $x^2-14x+y^2=-13$

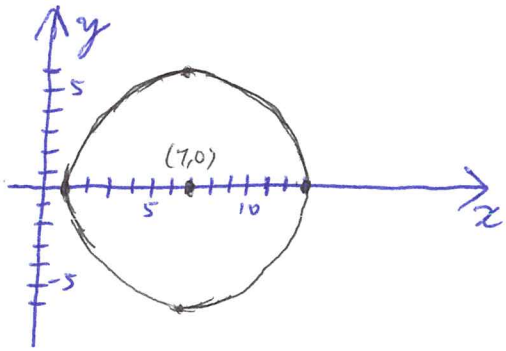
$\left(\frac{b_x}{2}\right)^2=(-7)^2=49$ $(x^2-14x+49)+y^2=-13+(49)$

$(x-7)^2+y^2=36$

$(x-(7))^2+(y-(0))^2=(6)^2$

center: $(7,0)$

radius: $r=6$



---

now distance and Midpoint

2) $(-4,-3)$ and $(2,5)$

(x,y) (h,k)

$((-4)-(2))^2+((-3)-(5))^2=r^2$

$(-6)^2+(-8)^2=r^2$

$36+64=r^2$

$100=r^2$

$\pm 10=r$

$r=+10$

4) $(-7,-3)$ and $(8,5)$

(x,y) (h,k)

$((-7)-(8))^2+((-3)-(5))^2=r^2$

$(-15)^2+(-8)^2=r^2$

$225+64=r^2$

$289=r^2$

$\pm 17=r$

$r=+17$

---

6) $(-1,3)$ and $(5,-5)$

(x,y) (h,k)

$((-1)-(5))^2+((3)-(-5))^2=r^2$

$(-6)^2+(8)^2=r^2$

$36+64=r^2$

$100=r^2$

$\pm 10=r$

$r=+10$

---

8) $(-8,-2)$ and $(7,6)$

(x,y) (h,k)

$((-8)-(7))^2+((-2)-(6))^2=r^2$

$(-15)^2+(-8)^2=r^2$

$225+64=r^2$

$289=r^2$

$\pm 17=r$

$r=+17$

---

10) $(-1,-2)$ and $(-3,4)$

(x,y) (h,k)

$((-1)-(-3))^2+((-2)-(4))^2=r^2$

$(2)^2+(6)^2=r^2$

$4+36=r^2$

$40=r^2$

$\pm\sqrt{40}=r$

$r=+\sqrt{40}=2\sqrt{10}$

12) $(-4,-5)$ and $(7,4)$
(x,y) (h,k)

$((-4)-(7))^2+((-5)-(4))^2=r^2$

$(-11)^2+(-9)^2=r^2$

$121+81=r^2$

$202=r^2$

$\pm\sqrt{202}=r$

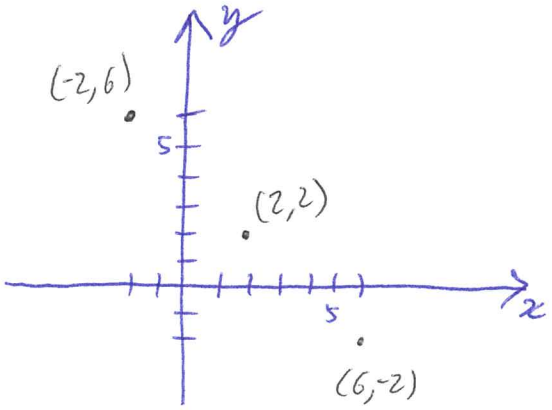
$r=+\sqrt{202}$

---

14) $(-2,6)$ and $(6,-2)$
(x_1,y_1) (x_2,y_2)

Midpoint: $\left(\frac{(-2)+(6)}{2}, \frac{(6)+(-2)}{2}\right)$

$=\left(\frac{4}{2},\frac{4}{2}\right)=(2,2)$



---

16) $(-3,-3)$ and $(6,-1)$
(x_1,y_1) (x_2,y_2)

Midpoint: $\left(\frac{(-3)+(6)}{2}, \frac{(-3)+(-1)}{2}\right)$

$=\left(\frac{4}{2},\frac{-4}{2}\right)=(2,-2)$