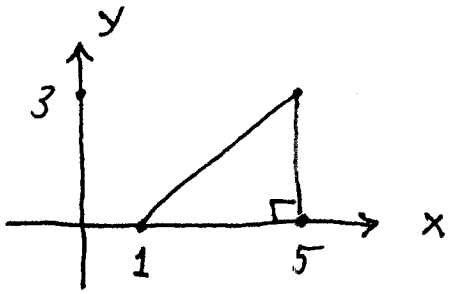
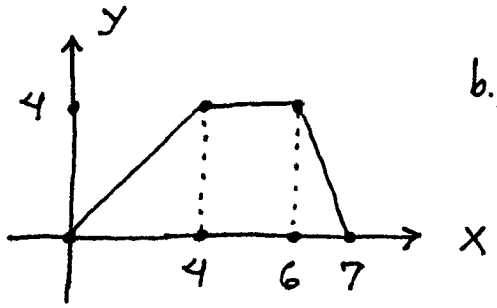
Section 1.4

3) a.)



b.) $A = \frac{1}{2}(4)(3) = 6$

4) a.)



b.) $A = \frac{1}{2}(7+2)(4)$
$= 18$

5) a.) $D = \sqrt{(0-(-3))^2 + (0-4)^2} = \sqrt{9+16} = \sqrt{25} = 5$

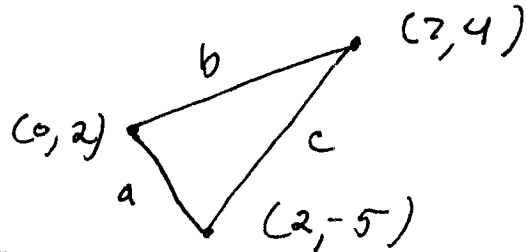
b.) $D = \sqrt{(2-7)^2 + (1-13)^2} = \sqrt{25+144} = \sqrt{169} = 13$

8) a.) $D = \sqrt{(-5-(-9))^2 + (-3-(-6))^2} = \sqrt{16+9} = \sqrt{25} = 5$

b.) $D = \sqrt{(\frac{9}{2}-(-\frac{5}{2}))^2 + (3-(-1))^2} = \sqrt{49+16} = \sqrt{61}$

11b) Distance from $(0,0)$ to $(-6,7)$ is $D = \sqrt{(-6-0)^2 + (7-0)^2} = \sqrt{36+49} = \sqrt{85}$; distance from $(0,0)$ to $(9,0)$ is 9, so $(-6,7)$ is farther from origin.

12a)



$a = \sqrt{(0-2)^2 + (2-(-5))^2} = \sqrt{4+49} = \sqrt{53}$,

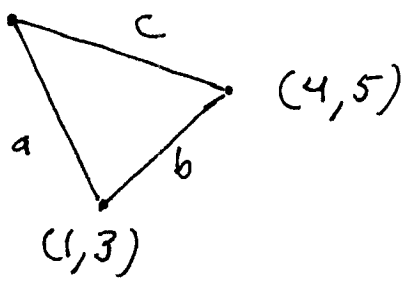
$b = \sqrt{(7-0)^2 + (4-2)^2} = \sqrt{49+4} = \sqrt{53}$,

$c = \sqrt{(7-2)^2 + (4-(-5))^2} = \sqrt{25+81} = \sqrt{106}$, and

$a^2 + b^2 = (\sqrt{53})^2 + (\sqrt{53})^2 = 53 + 53 = 106$

$c^2 = (\sqrt{106})^2 = 106$, and $a^2 + b^2 = c^2$, so triangle is right and isosceles

13) b.) $(-3,9)$



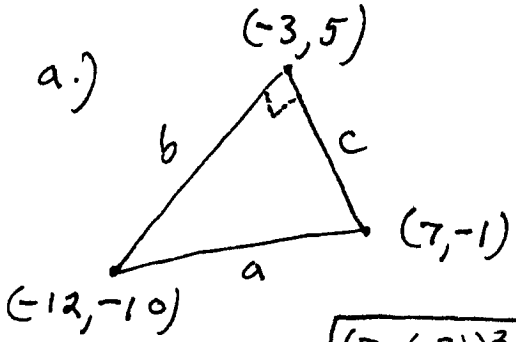
$a = \sqrt{(-3-1)^2 + (9-3)^2} = \sqrt{16+36} = \sqrt{52}$,

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

$c = \sqrt{(-3-4)^2 + (9-5)^2} = \sqrt{49+16} = \sqrt{65}$, and

$a^2 + b^2 = 52 + 13 = 65$, $c^2 = 65$, but $a^2 + b^2 = c^2$ so triangle is right.

a.)



$a = \sqrt{(7-(-12))^2 + (-1-(-10))^2}$

$= \sqrt{361+81} = \sqrt{442}$

$b = \sqrt{(-12-(-3))^2 + (-10-5)^2}$,

$= \sqrt{81+225} = \sqrt{306}$

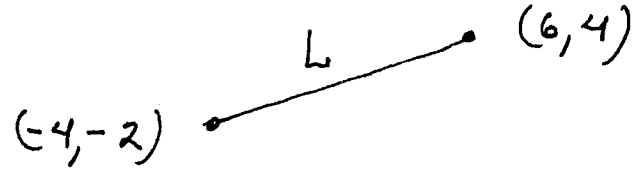
$c = \sqrt{(7-(-3))^2 + (-1-5)^2} = \sqrt{100+36} = \sqrt{136}$, and

$b^2 + c^2 = 306 + 136 = 442$, $a^2 = 442$, and $b^2 + c^2 = a^2$ so triangle is right;

Area $= \frac{1}{2}$(base)(height) $= \frac{1}{2}(\sqrt{306})(\sqrt{136})$

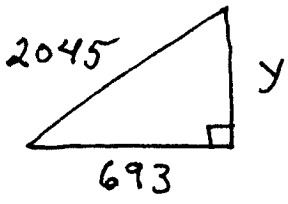
$= \frac{1}{2}\sqrt{9 \cdot 34} \cdot \sqrt{4 \cdot 34} = \frac{1}{2}(3)\sqrt{34}\,(2)\sqrt{34}$

$= 3(34) = 102$

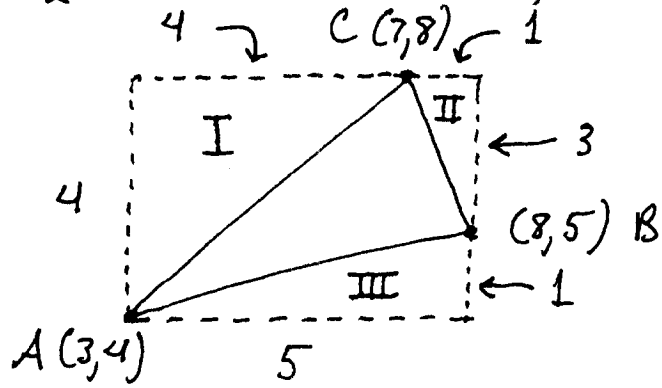
19) 

$L = \sqrt{(6-(-4))^2 + (4-(-2))^2} = \sqrt{100+36} = \sqrt{136}$
$= \sqrt{4 \cdot 34} = 2\sqrt{34}$ so radius of circle is
$\frac{1}{2}L = \sqrt{34}$; midpoint is $\left(\frac{6+(-4)}{2}, \frac{4+(-2)}{2}\right) = (1,1)$
so center of circle is $(1,1)$ and equation is
$(x-1)^2 + (y-1)^2 = (\sqrt{34})^2 = 34$.

17) b.) $\left(\frac{-4+5}{2}, \frac{0+-3}{2}\right) = \left(\frac{1}{2}, \frac{-3}{2}\right)$
c.) $\left(\frac{3-1}{2}, \frac{-6-2}{2}\right) = (1,-4)$

28) 

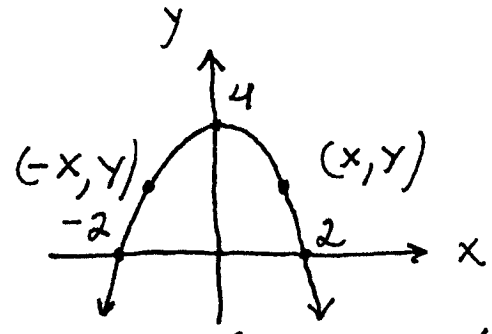
By Pythagorean Theorem
$693^2 + y^2 = 2045^2 \rightarrow$
$y = \sqrt{2045^2 - 693^2} = 1924$,
so Area $= \frac{1}{2}(693)(1924) = 666,666$.

34) 

Area of ΔABC is
$(4)(5) - \frac{1}{2}(4)(4) - \frac{1}{2}(1)(3) - \frac{1}{2}(5)(1)$
$= 20 - 8 - 3/2 - 5/2$
$= 12 - 4$
$= 8$.

Section 1.7

9)

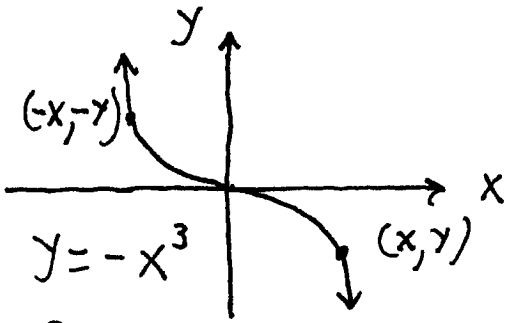


assume (x,y) is on graph. Show $(-x,y)$ is on graph:

$Y = 4 - x^2$ (let x be $-x$) →

$Y = 4 - (-x)^2 = 4 - x^2 \rightarrow y = 4 - x^2$ (TRUE)

10)



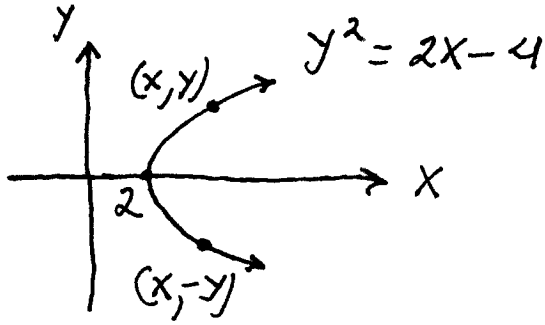
Assume (x,y) is on graph. Show $(-x,-y)$ is on graph:

$y = -x^3$ (let x be $-x$ and y be $-y$) →

$(-y) = -(-x)^3 \rightarrow -y = -(-x^3) \rightarrow -y = x^3 \rightarrow$

$y = -x^3$ (TRUE)

21)



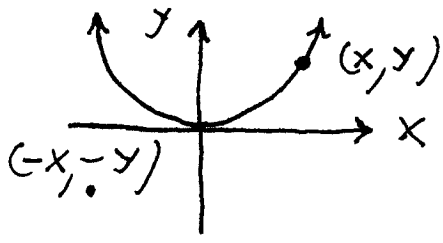
Assume (x,y) is on graph. Show $(x,-y)$ is on graph:

$y^2 = 2x - 4$ (let y be $-y$) →

$(-y)^2 = 2x - 4 \rightarrow y^2 = 2x - 4$ (TRUE)

24)

$y = 2x^2$



Assume (x,y) is on graph. Show $(-x,-y)$ is not on graph:

$y = 2x^2$ (let x be $-x$, y be $-y$) →

$(-y) = 2(-x)^2 \rightarrow -y = 2x^2 \rightarrow y = -2x^2$

(FALSE)

46) $x^2+y^2-10x+2y+17=0 \rightarrow$

$(x^2-10x)+(y^2+2y) = -17 \rightarrow$ (complete the square)

$(x^2-10x+25)+(y^2+2y+1) = -17+25+1 \rightarrow$

$(x-5)^2+(y+1)^2 = 9 = 3^2$ so center is $(5,-1)$ and radius $= 3$; if $x=0$ then $25+(y+1)^2 = 9 \rightarrow$ $(y+1)^2 = -16$ (impossible) so circle does not intersect y-axis

50) $3x^2+3y^2+5x-4y = 1 \rightarrow$

$(3x^2+5x)+(3y^2-4y) = 1 \rightarrow$ (factor out 3)

$3(x^2+\frac{5}{3}x)+3(y^2-\frac{4}{3}y) = 1 \rightarrow$

$(x^2+\frac{5}{3}x)+(y^2-\frac{4}{3}y) = \frac{1}{3} \rightarrow$ (complete square)

$(x^2+\frac{5}{3}x+\frac{25}{36})+(y^2-\frac{4}{3}y+\frac{4}{9}) = \frac{1}{3}+\frac{25}{36}+\frac{4}{9} \rightarrow$

$(x+\frac{5}{6})^2+(y-\frac{2}{3})^2 = \frac{53}{36} = \left(\frac{\sqrt{53}}{6}\right)^2$ so center is $\left(\frac{-5}{6}, \frac{2}{3}\right)$ and radius $= \frac{\sqrt{53}}{6}$; if $x=0$ then $\frac{25}{36}+(y-\frac{2}{3})^2 = \frac{53}{36} \rightarrow (y-\frac{2}{3})^2 = \frac{28}{36} \rightarrow$

$y-\frac{2}{3} = \pm\frac{\sqrt{28}}{6} = \frac{\pm 2\sqrt{7}}{6} = \frac{\pm\sqrt{7}}{3} \rightarrow$

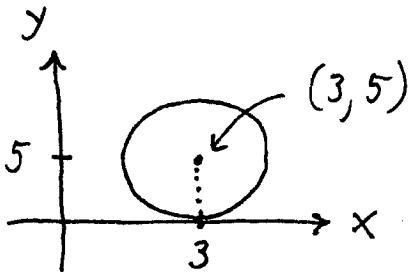
$y = \frac{2}{3} \pm \frac{\sqrt{7}}{3}$ is where circle intersects y-axis.

55) $(-2,-10)$ ← radius → $(3,2)$

radius $= \sqrt{(3-(-2))^2+(2-(-10))^2} = \sqrt{25+144}$

56) $= \sqrt{169} = 13$, so circle is

$(x-3)^2+(y-2)^2 = 13^2 = 169$



radius = 5 so circle is

$(x-3)^2+(y-5)^2 = 5^2 = 25$

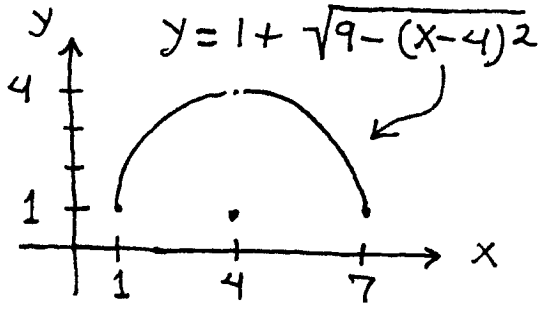
Worksheet 1

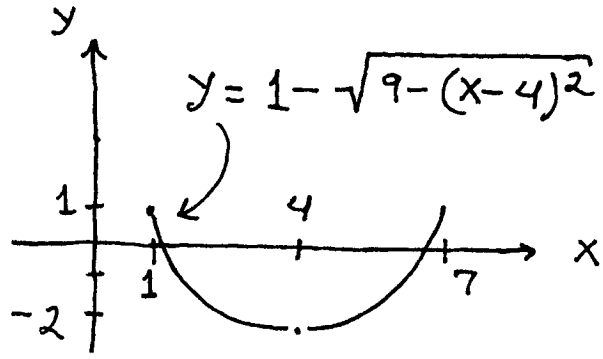
1) $(x-3)^2+(y-1)^2=5^2$, center is $(3,1)$ and radius $=5$; if $x=0$ then $9+(y-1)^2=25$ $\rightarrow$ $(y-1)^2=16$ $\rightarrow$ $y-1=\pm 4$ $\rightarrow$ $y=1\pm 4$ $\rightarrow$ $y=5$ or $y=-3$ is where circle intersects y-axis

2) $(x-4)^2+(y-1)^2=3^2$ $\rightarrow$ (center $(4,1)$, radius $=3$)

$(y-1)^2=9-(x-4)^2$ $\rightarrow$

$y-1=\pm\sqrt{9-(x-4)^2}$ $\rightarrow$ $y=1\pm\sqrt{9-(x-4)^2}$





3) $x^2-6x+y^2-4y+4=0$ $\rightarrow$

$(x^2-6x+9)+(y^2-4y+4)=-4+9+4$ $\rightarrow$

$(x-3)^2+(y-2)^2=9$ so center is $(3,2)$; new circle is $(x-3)^2+(y-2)^2=r^2$ and passes through origin so $x=0$, $y=0$ $\rightarrow$

$(0-3)^2+(0-2)^2=r^2$ $\rightarrow$ $9+4=r^2$ $\rightarrow$

circle is $(x-3)^2+(y-2)^2=13$.

4) $x^2+y^2-6x-4y+12=0$ $\rightarrow$

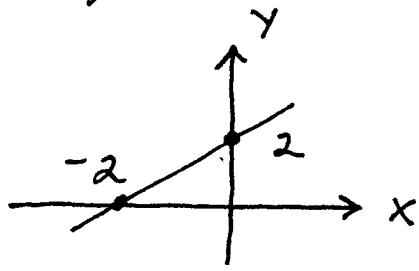
$(x^2-6x+9)+(y^2-4y+4)=-12+9+4$ $\rightarrow$

$(x-3)^2+(y-2)^2=1$ $\rightarrow$ center is $(3,2)$;

$x^2+y^2-14x+47=0 \rightarrow (x^2-14x+49)+y^2=-47+49$
$\rightarrow (x-7)^2+(y-0)^2=2$ so center is $(7,0)$;
midpoint of centers is $\left(\frac{3+7}{2},\frac{2+0}{2}\right)=(5,1)$
so new circle is
$(x-5)^2+(y-1)^2=r^2$ and circle passes
through $(-4,1) \rightarrow (-4-5)^2+(1-1)^2=r^2 \rightarrow$
$81=r^2$ so circle is $(x-5)^2+(y-1)^2=81$.

5) $13=\sqrt{(12-0)^2+(t-2)^2} \rightarrow 13^2=12^2+(t-2)^2 \rightarrow$
$169=144+(t-2)^2 \rightarrow 25=(t-2)^2 \rightarrow$
$t-2=\pm 5 \rightarrow t=2\pm 5 \rightarrow t=7$ or $t=-3$

6) $x^2+y^2+4x-4y+4=0$ so
$x=0 \rightarrow y^2-4y+4=0 \rightarrow (y-2)^2=0 \rightarrow y=2$
is y-intercept; $y=0 \rightarrow x^2+4x+4=0 \rightarrow$
$(x+2)^2=0 \rightarrow x=-2$ is x-intercept
(point $(-2,0)$) then $y=mx+b \rightarrow$
$y=mx+2$ and $0=m(-2)+2 \rightarrow$
$2m=2 \rightarrow m=1 \rightarrow$
$y=1\cdot x+2 \rightarrow$
$y=x+2$



7) $4x^2+8x+4y^2-24y+15=0 \rightarrow$

$4(x^2+2x)+4(y^2-6y)=-15 \rightarrow$

$(x^2+2x)+(y^2-6y)=-15/4 \rightarrow$ (complete the square)

$(x^2+2x+1)+(y^2-6y+9)=-15/4+1+9 \rightarrow$

$(x+1)^2+(y-3)^2=-15/4+10$ so center of circle is $(-1,3)$ and line also passed through point $(3,-5)$ so slope

$m=\frac{3-(-5)}{-1-3}=\frac{8}{-4}=-2 \rightarrow y-(-5)=-2(x-3) \rightarrow$

$y+5=-2x+6 \rightarrow$

$2x+y-1=0$;

$x=0: y=1$

$y=0: x=1/2$