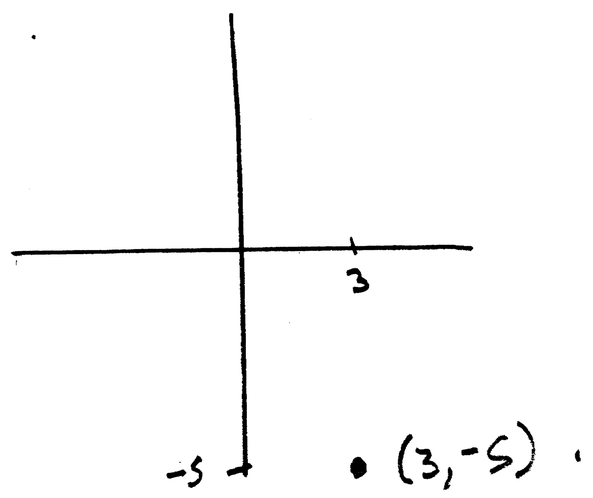
1.9

1.



2. $d = \sqrt{(a-c)^2 + (b-d)^2}$

$d = [(1-7)^2 + (2-10)^2]^{1/2}$
$= [(-6)^2 + (-8)^2]^{1/2}$
$= (36 + 64)^{1/2}$
$= 100^{1/2}$
$d = 10.$

3. $\left(\frac{a+c}{2}, \frac{b+d}{2}\right)$

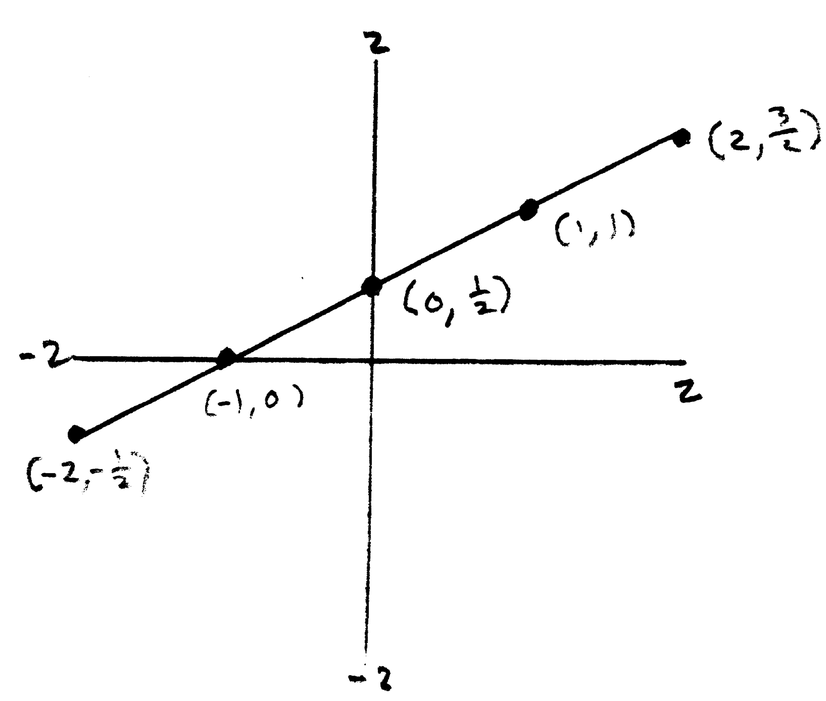
$x = \frac{1+7}{2} = \frac{8}{2} = 4$
$y = \frac{2+10}{2} = \frac{12}{2} = 6$
$(4, 6)$

4. 2, 3

$2(3) \stackrel{?}{=} 2+1$
$6 \neq 3$
no

x	y	(x,y)
-2	$-\frac{1}{2}$	$(-2, -\frac{1}{2})$
-1	0	(-1, 0)
0	$\frac{1}{2}$	$(0, \frac{1}{2})$
1	1	(1, 1)
2	$\frac{3}{2}$	$(2, \frac{3}{2})$

$y = \frac{x+1}{2}$



5. a. y, x

$2(0) = x+1$
$0 = x+1$
$x = -1$
$(-1, 0)$

b. x, y

$2y = 0+1$
$2y = 1$
$y = \frac{1}{2}$
$(0, \frac{1}{2})$

6. $c(1, 2)$ $r = 3$

7. a. $(a, -b)$
b. $(-a, b)$
c. $(-a, -b)$

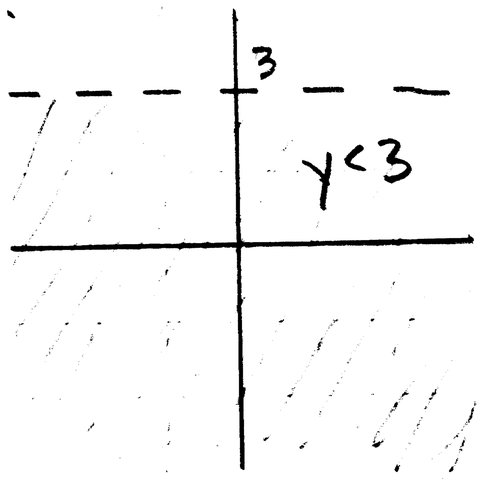
8. a. $(\pm 3, 0)$, $(0, 2)$ and $(0, -2)$

b. y-axis.

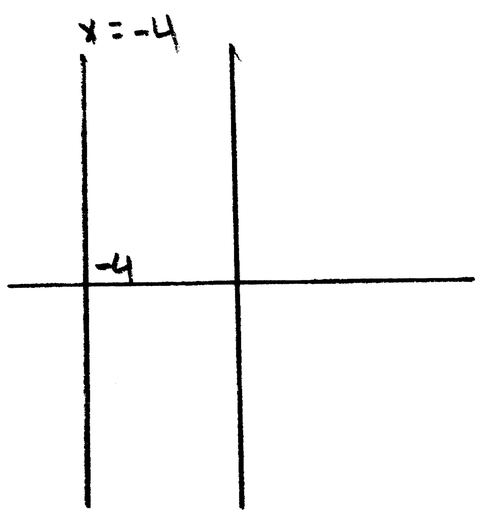
9. Yes.

10. No: $xy = 1$

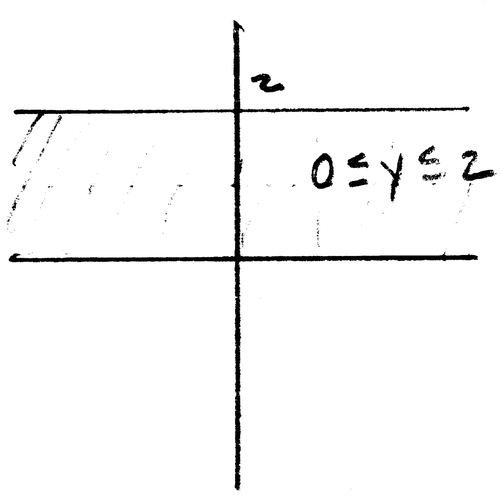
16. a.



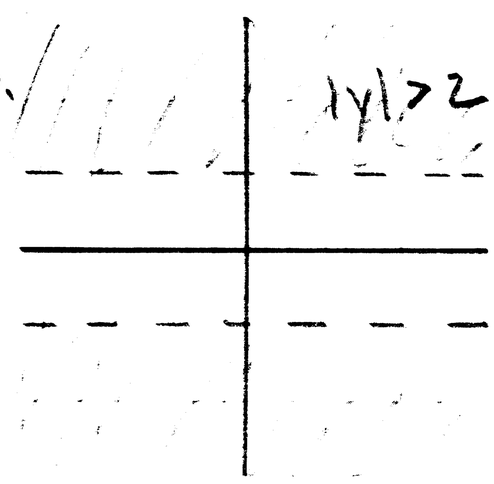
b.



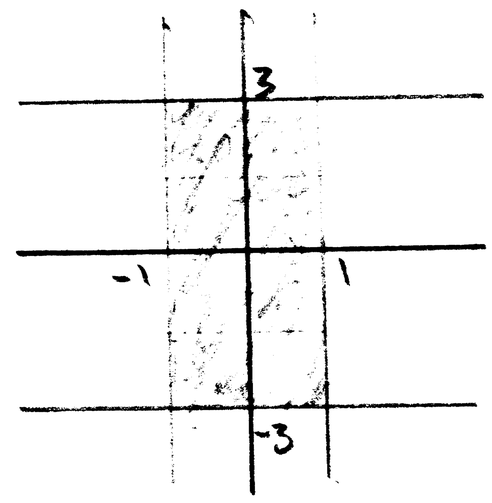
18. a.



b.

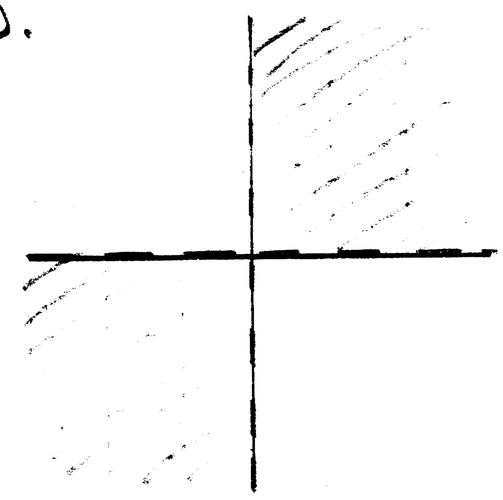


20. a



$|x| \le 1$ and $|y| \le 3$

b.



$xy > 0$
$x > 0$ and $y > 0$
or
$x < 0$ and $y < 0$

22. $(-2,-1)$ $(2,2)$

a. $d = [(-2-2)^2 + (-1-2)^2]^{1/2}$
$= [(-4)^2 + (-3)^2]^{1/2}$
$= (16+9)^{1/2}$
$= \sqrt{25}$
$d = 5$

b. $x = \frac{-2+2}{2} = \frac{0}{2} = 0$
$y = \frac{-1+2}{2} = \frac{1}{2}$
$(0, \frac{1}{2})$

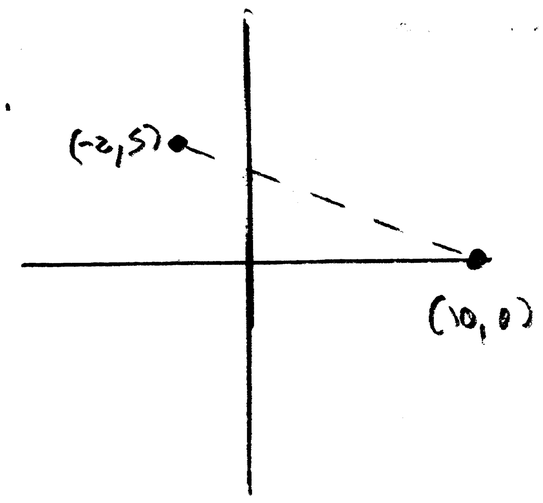
24. $(-2,-3)$ $(4,-1)$

a. $d = [(-2-4)^2 + (-3+1)^2]^{1/2}$
$= [(-6)^2 + (-2)^2]^{1/2}$
$= (36+4)^{1/2}$
$= \sqrt{40}$
$d = 2\sqrt{10}$

b. $x = \frac{-2+4}{2} = \frac{2}{2} = 1$
$y = \frac{-3-1}{2} = \frac{-4}{2} = -2$
$(1,-2)$

26. $(-2,5)$ $(10,0)$

a.

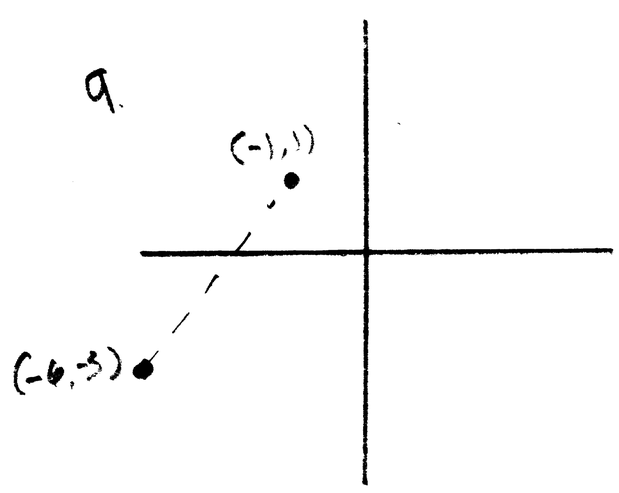


b. $d = [(-2-10)^2 + (5-0)^2]^{1/2}$
$= [(-12)^2 + 5^2]^{1/2}$
$= (144 + 25)^{1/2}$
$= 169^{1/2}$
$d = 13$

c. $x = \frac{-2+10}{2} = \frac{8}{2} = 4$
$y = \frac{5+0}{2} = \frac{5}{2}$
$(4, \frac{5}{2})$

28. $(-1,1)$ $(-6,-3)$

a.

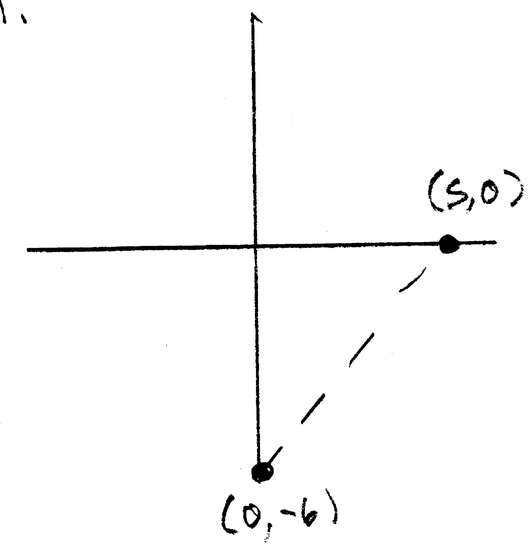


b. $d = [(-1+6)^2 + (1+3)^2]^{1/2}$
$= (5^2 + 4^2)^{1/2}$
$= (25 + 16)^{1/2}$
$d = \sqrt{41}$

c. $x = \frac{-1-6}{2} = -\frac{7}{2}$
$y = \frac{1-3}{2} = \frac{-2}{2} = -1$
$(-\frac{7}{2}, -1)$.

30. $(0,-6)$ $(5,0)$

a.



b. $d = [(0-5)^2 + (-6-0)^2]^{1/2}$
$= [(-5)^2 + (-6)^2]^{1/2}$
$= (25 + 36)^{1/2}$
$d = \sqrt{61}$

c. $x = \frac{0+5}{2} = \frac{5}{2}$
$y = \frac{-6+0}{2} = \frac{-6}{2} = -3$
$(\frac{5}{2}, -3)$

72. a. $4x^2 + 25y^2 = 100$

$4x^2 + 25(0)^2 = 100$
$4x^2 = 100$
$x^2 = 25$
$x = \pm 5$
$(\pm 5, 0)$

$4(0)^2 + 25y^2 = 100$
$25y^2 = 100$
$y^2 = 4$
$y = \pm 2$
$(0, \pm 2)$

72. b. $x^2 - xy + 3y = 1$

$x^2 - x(0) + 3(0) = 1$
$x^2 = 1$
$x = \pm 1$
$(\pm 1, 0)$

$0^2 - 0y + 3y = 1$
$3y = 1$
$y = \frac{1}{3}$
$(0, \frac{1}{3})$

74. a. $y = \sqrt{x^2 - 16}$

$0 = \sqrt{x^2 - 16}$
$x^2 - 16 = 0$
$x^2 = 16$
$x = \pm 4$
$(\pm 4, 0)$

$y = \sqrt{0^2 - 16}$
$y = \sqrt{-16}$
none.

b. $y = \sqrt{64 - x^3}$

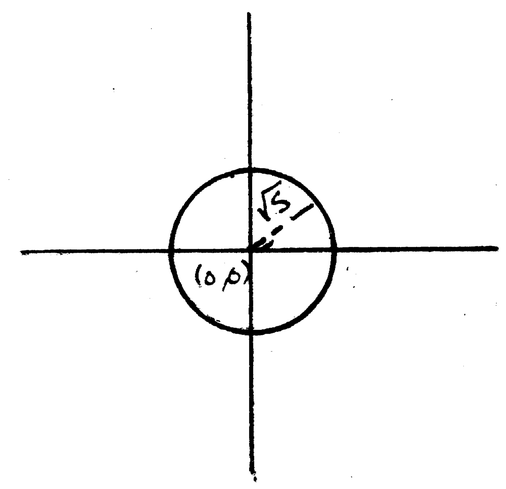
$0 = \sqrt{64 - x^3}$
$64 - x^3 = 0$
$x^3 = 64$
$x = 4$
$(4, 0)$

$y = \sqrt{64 - 0^3}$
$y = \sqrt{64}$
$y = 8$
$(0, 8)$

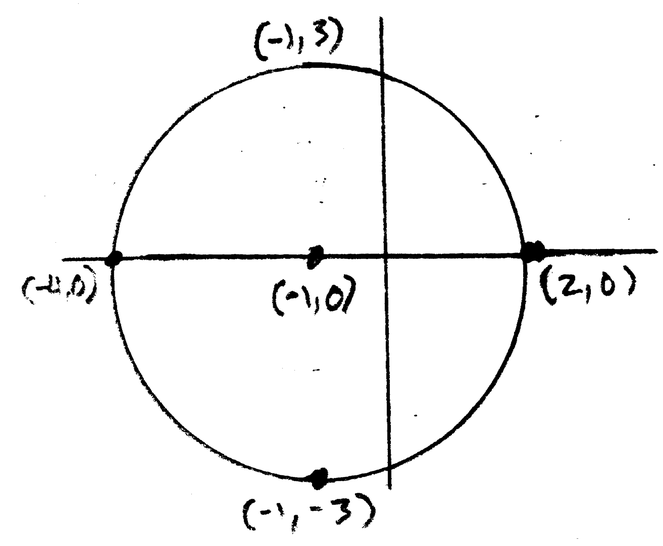
76. $(\pm 3, 0)$ $(0, \pm 2)$

78. $(\pm 8, 0)$ $(0, 4)$

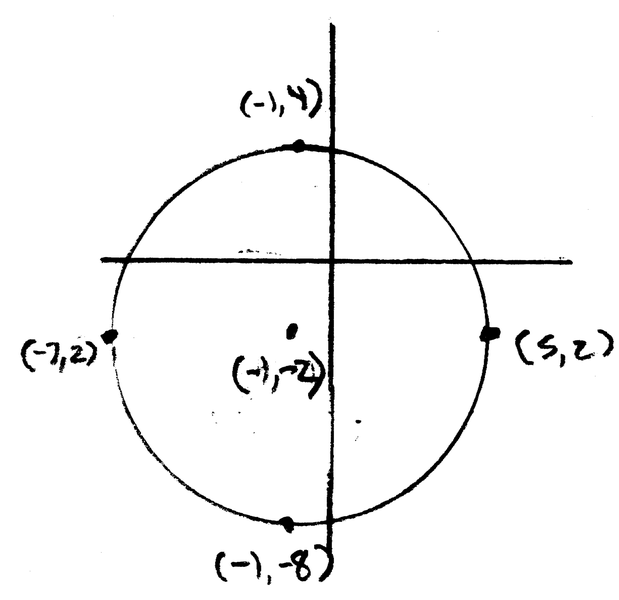
84. $x^2 + y^2 = 5$
$c(0,0)$ $r = \sqrt{5}$



86. $(x+1)^2 + y^2 = 9$
$c(-1,0)$ $r = 3$



88. $(x+1)^2 + (y+2)^2 = 36$
$c(-1,-2)$ $r = 6$



90. $C(-1,-4)$ $r=8$

$(x+1)^2+(y+4)^2=64$

92. $C(-1,5)$, passes through $(-4,-6)$

$r=[(-1+4)^2+(5+6)^2]^{1/2}$

$=(3^2+11^2)^{1/2}$

$=(9+121)^{1/2}$

$r=\sqrt{130}$

$(x+1)^2+(y-5)^2=130$

94. $P(-1,3)$ $Q(7,-5)$

center at midpoint.

$x=\frac{-1+7}{2}=\frac{6}{2}=3$

$y=\frac{3-5}{2}=\frac{-2}{2}=-1$

$C(3,-1)$

$r=\frac{1}{2}[(-1-7)^2+(3+5)^2]^{1/2}$

$=\frac{1}{2}[(-8)^2+8^2]^{1/2}$

$=\frac{1}{2}(64+64)^{1/2}$

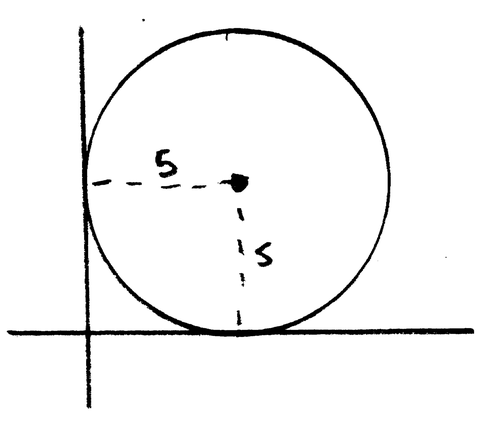
$=\frac{1}{2}(128)^{1/2}$

$=\frac{1}{2}8\sqrt{2}$

$r=4\sqrt{2}$

$(x-3)^2+(y+1)^2=32$

96.



$C(5,5)$ $r=5$

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

98. $C(-1,1)$

$P(2,0)$

$r=[(-1-2)^2+(1-0)^2]^{1/2}$

$=[(-3)^2+1^2]^{1/2}$

$=(9+1)^{1/2}$

$r=\sqrt{10}$

$(x+1)^2+(y-1)^2=10$

100 $x^2+(y^2+6y+9)=-2+9$

$x^2+(y+3)^2=7$

$C(0,-3)$ $r=\sqrt{7}$

102. $(x^2+\frac{1}{2}x+\frac{1}{16})+(y^2+2y+1)=-\frac{1}{16}+\frac{1}{16}+1$

$(x+\frac{1}{4})^2+(y+1)^2=1$

$C(-\frac{1}{4},-1)$ $r=1$

104. $3x^2+3y^2+6x-y=0$

$x^2+y^2+2x-\frac{1}{3}y=0$

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

$(x+1)^2+(y-\frac{1}{6})^2=\frac{37}{36}$

$C(-1,\frac{1}{6})$ $r=\frac{\sqrt{37}}{6}$

106. $x=y^4-y^2$

X: $x=(-y)^4-(-y)^2$

$x=y^4-y^2$

YES

Y: $-x=y^4-y^2$

NO

O: $-x=(-y)^4-(-y^2)$

$-x=y^4-y^2$

NO

108. $x^4y^4 + x^2y^2 = 1$

X: $x^4(-y)^4 + x^2(-y)^2 = 1$
$x^4y^4 + x^2y^2 = 1$
YES

Y: $(-x)^4y^4 + (-x)^2y^2 = 1$
$x^4y^4 + x^2y^2 = 1$
YES.

O: $(-x)^4(-y)^4 + (-x)^2(-y)^2 = 1$
$x^4y^4 + x^2y^2 = 1$
YES.

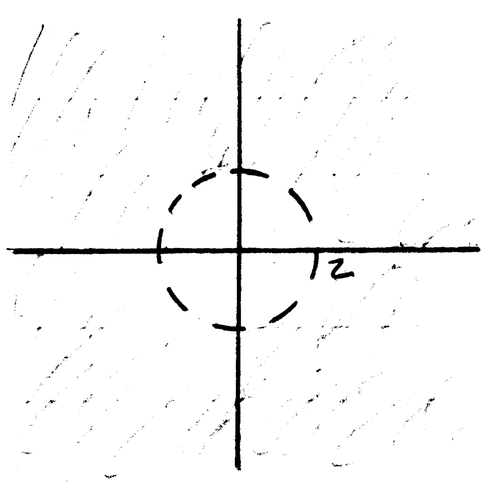
110. $y = x^2 + |x|$

X: $(-y) = x^2 + |x|$
NO

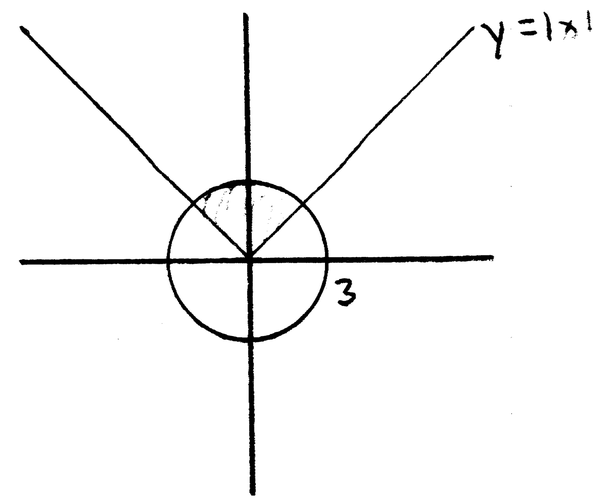
Y: $y = (-x)^2 + |-x|$
$y = x^2 + |x|$
YES

O: $-y = (-x)^2 + |-x|$
$-y = x^2 + |x|$
NO.

116. $\{(x,y) \mid x^2 + y^2 > 4\}$



118. $x^2 + y^2 \le 9$
$y \ge |x|$



$A = \frac{1}{4}\pi(3)^2 = \frac{9}{4}\pi$