MATH 195

§1.9 COORDINATE PLANE

1, 2, 3, 11, 12, 22, 35, 44, 66, 67, 83, 85, 93, 97, 99, 103

1. $(3, -5)$

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

NOTE: SINCE THE TERMS ARE SQUARED, THE ORDER OF SUBTRACTION DOESN'T MATTER.

$$\sqrt{(7-1)^2 + (10-2)^2} = \sqrt{6^2 + 8^2} = \sqrt{100} = \boxed{10}$$

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

$$\left(\frac{1+7}{2}, \frac{2+10}{2}\right) = \boxed{(4, 6)}$$

11.

A	$(5, 1)$	E	$(-4, -1)$
B	$(1, 2)$	F	$(-2, 0)$
C	$(-2, 6)$	G	$(-1, -3)$
D	$(-6, 2)$	H	$(2, -2)$

12. QI: A, B

QIII: E, G

NOTE: TECHNICALLY, F IS NOT IN ANY QUADRANT SINCE ITS ON THE X-AXIS.

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

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

$$= \sqrt{4^2 + 3^2} = \sqrt{25} = \boxed{5}$$

MIDPOINT: $\left(\frac{-2+2}{2}, \frac{-1+2}{2}\right)$

$$\boxed{\left(0, \frac{1}{2}\right)}$$

35. NOTE THAT DISTANCE BETWEEN (x,y) & $(0,0)$ IS $\sqrt{x^2+y^2}$. FURTHERMORE

$d_1^2 < d_2^2$ DISTANCE SQUARED

$\Updownarrow$

$d_1 < d_2$ DISTANCE

$6^2 + 7^2 = 36 + 49 = 85$

$(-5)^2 + 8^2 = 25 + 64 = 89$ ← BIGGER , $\boxed{(-5,8)}$

44. $d(A,B) = \sqrt{(3+1)^2 + (11-3)^2} = \sqrt{4^2+8^2} = \sqrt{16+64}$

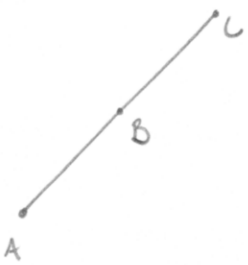
$= \sqrt{80} = 4\sqrt{5}$

$d(B,C) = \sqrt{(5-3)^2 + (15-11)^2} = \sqrt{2^2+4^2} = \sqrt{20} = 2\sqrt{5}$

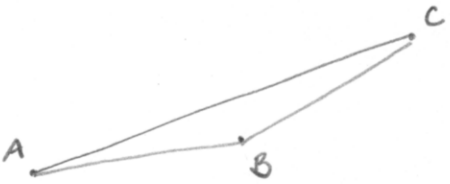
$d(A,C) = \sqrt{(5+1)^2 + (15-3)^2} = \sqrt{6^2+12^2} = \sqrt{180} = 6\sqrt{5}$

SINCE $d(A,C) = d(A,B) + d(B,C)$,

B MUST BE ON THE LINE CONNECTING A & C



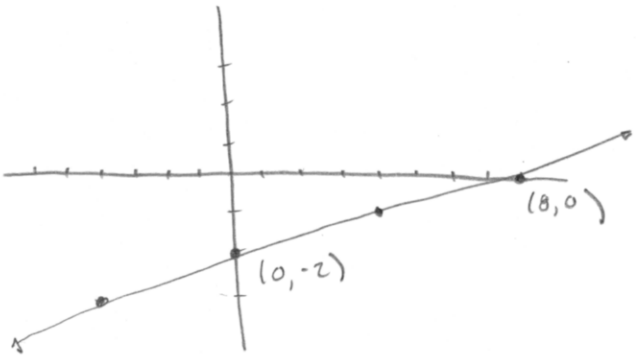
OTHERWISE



$d(A,B) + d(B,C) > d(A,C)$

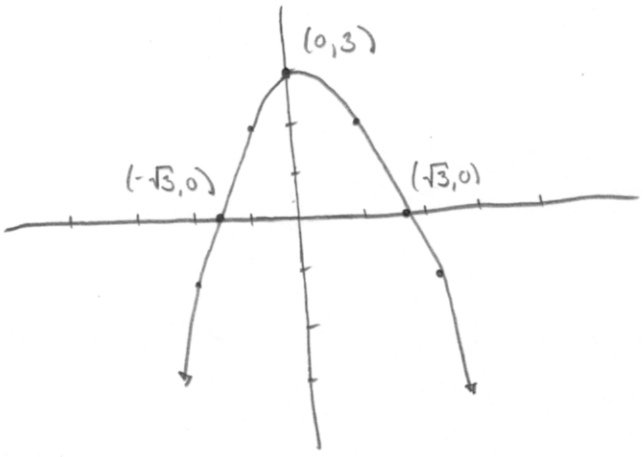
66. $x - 4y = 8$

x	y	
0	-2	← y-int.
8	0	← x-int.
4	-1	
-4	-3	



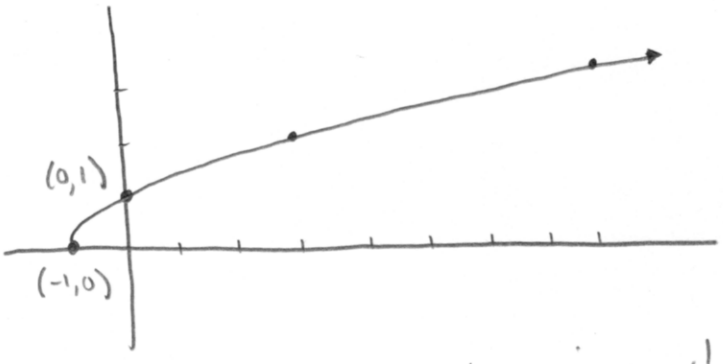
$y = -x^2 + 3$

x	y	
0	3	← y-int.
$\pm\sqrt{3}$	0	← x-int.'s
± 1	2	
± 2	-1	



67. $y = \sqrt{x+1}$

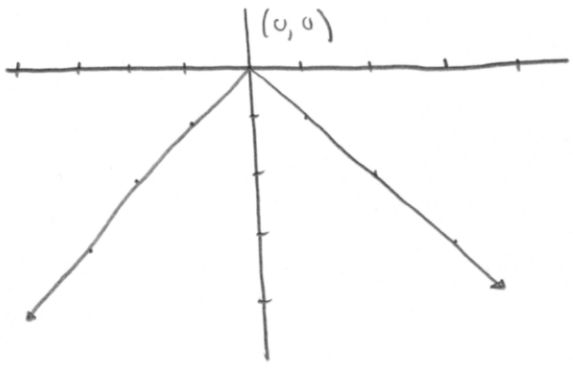
x	y
0	1
-1	0
3	2
8	3



$y = -|x|$

x	y
0	0
± 1	-1
± 2	-2
± 3	-3

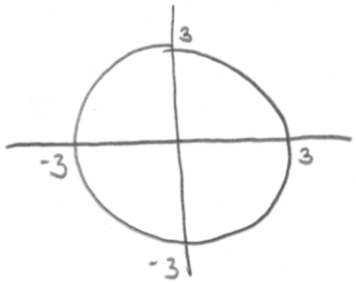
↓ Both x- & y-int!



83. $x^2 + y^2 = 9$

CENTER: $(0,0)$ ORIGIN

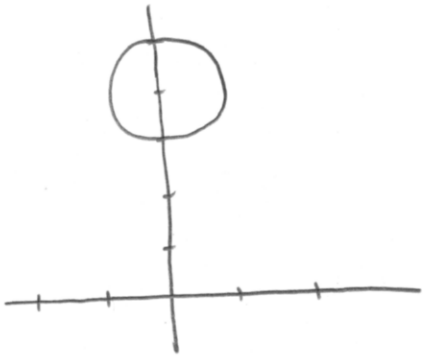
RADIUS = 3



85. $x^2 + (y-4)^2 = 1$

CENTER: $(0,4)$

RADIUS: 1



93. DIAMETER $= \sqrt{(5+1)^2 + (9-1)^2} = \sqrt{36+64} = 10$

$\Rightarrow$ RADIUS = 5

CENTER = MIDPOINT $= \left(\frac{5-1}{2}, \frac{9+1}{2}\right) = (2,5)$

$\therefore$ $\boxed{(x-2)^2 + (y-5)^2 = 25}$

97. CENTER: $(-2,2)$

RADIUS: 2

$\Rightarrow$ $\boxed{(x+2)^2 + (y-2)^2 = 4}$

99. $x^2 + y^2 + 4x - 6y + 12 = 0$

$x^2 + 4x \quad + y^2 - 6y = -12$

$x^2 - 2ax + a^2 \quad + y^2 - 2by + b^2$

$(x - a)^2 + (y - b)^2 = r^2$

$-2a = 4$ $\qquad$ $-2b = -6$

$a = -2$ $\qquad$ $b = 3$

$a^2 = 4$ $\qquad$ $b^2 = 9$

$x^2 + 4x + 4 + y^2 - 6y + 9 = -12 + 4 + 9$

$(x + 2)^2 + (y - 3)^2 = 1$ $\qquad$ CIRCLE ✓

CENTER : $(-2, 3)$

RADIUS : 1

103. $2x^2 + 2y^2 - 3x = 0$ (DIV. BY 2)

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

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

$x^2 - 2ax + a^2$

$(x - a)^2$

$-\frac{3}{2} = -2a$

$a = \frac{3}{4}$

$a^2 = \frac{9}{16}$

$x^2 - \frac{3}{2}x + \frac{9}{16} + y^2 = \frac{9}{16}$

$(x - \frac{3}{4})^2 + y^2 = \frac{9}{16}$ CIRCLE ✓

CENTER: $(\frac{3}{4}, 0)$

RADIUS: $\frac{3}{4}$