

7.5 SYSTEMS OF INEQUALITIES IN 2 VARIABLES

IN 1 VARIABLE

$$-7 + 7 - 2x \leq -3 + -7$$

$$-2x \leq -10$$

$$\frac{-2x}{-2} \geq \frac{-10}{-2}$$

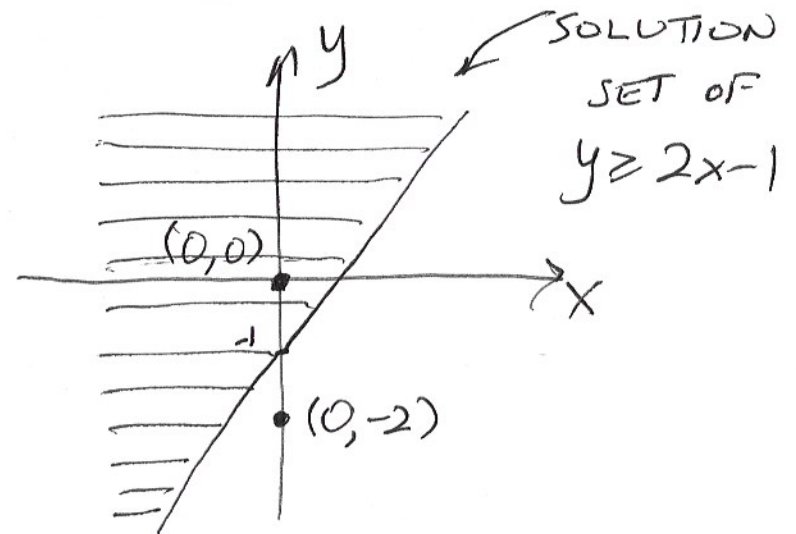
$$x \geq 5$$



SOLUTION SET
IN GRAPHICAL
FORM

IN 2 VARIABLES

$$y \geq 2x - 1$$



① GRAPH EQUALITY

$$y = 2x - 1$$

② DOTTED $\rightarrow$ NO =

SOLID $\rightarrow$ INCLUDES =

③ TEST POINTS + SHADE

$$(0, 0): 0 \geq 2(0) - 1 \rightarrow 0 \geq -1 \checkmark$$

$$(0, -2): -2 \geq 2(0) - 1 \rightarrow -2 \geq -1 \times$$

$$x^2 - y \geq 2x$$

GRAPH $x^2 - y = 2x$

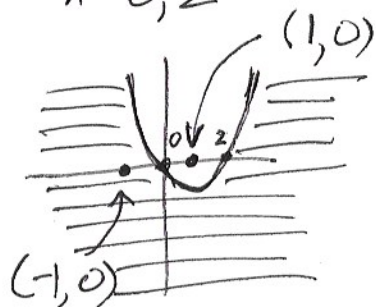
$$x^2 - 2x = y$$

$$y = x^2 - 2x \text{ PARABOLA}$$

$$y = x(x-2) \text{ OPEN UP}$$

$$X\text{-INT: } 0 = x(x-2) \quad x^2, +x^2$$

$$x = 0, 2 \quad \text{UP/DOWN UP}$$



SOL'N SET

$$\text{OF } x^2 - y \geq 2x$$

SOLID $\geq$

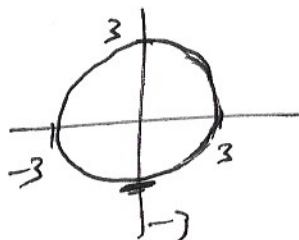
TEST POINTS

$$(1, 0): 1^2 - 0 \geq 2(1) \rightarrow 1 \geq 2 \quad \times$$

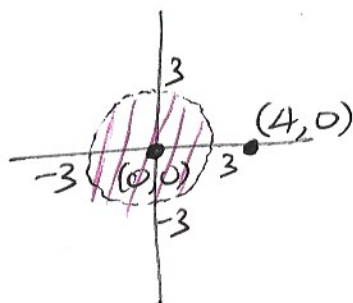
$$(-1, 0): (-1)^2 - 0 \geq 2(-1) \rightarrow 1 \geq -2 \quad \checkmark$$

$$x^2 + y^2 < 9$$

GRAPH $x^2 + y^2 = 9$ CIRCLE CENTER $(0, 0)$
RADIUS $\sqrt{9} = 3$



2) DOTTED

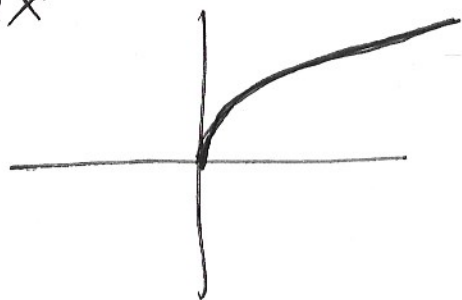


SOL'N SET
OF $x^2 + y^2 < 9$

3) TEST
 $(0, 0): 0^2 + 0^2 < 9 \rightarrow 0 < 9 \checkmark$
 $(4, 0): 4^2 + 0^2 < 9 \rightarrow 16 < 9 \times$

$$y < \sqrt{x}$$

GRAPH $y = \sqrt{x}$

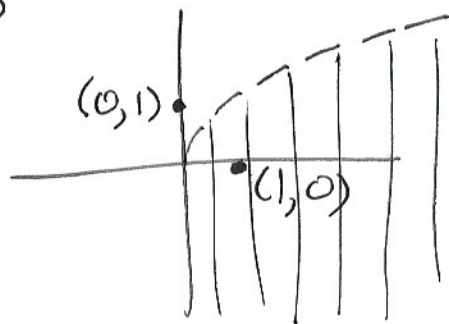


DOMAIN OF $\sqrt{x}$

$$\text{IS } x \geq 0$$

(EXCLUDE $x < 0$)

2) DOTTED



3) TEST

$$(0,1): 1 < \sqrt{0} \rightarrow 1 < 0 \text{ X}$$

$$(1,0): 0 < \sqrt{1} \rightarrow 0 < 1 \checkmark$$

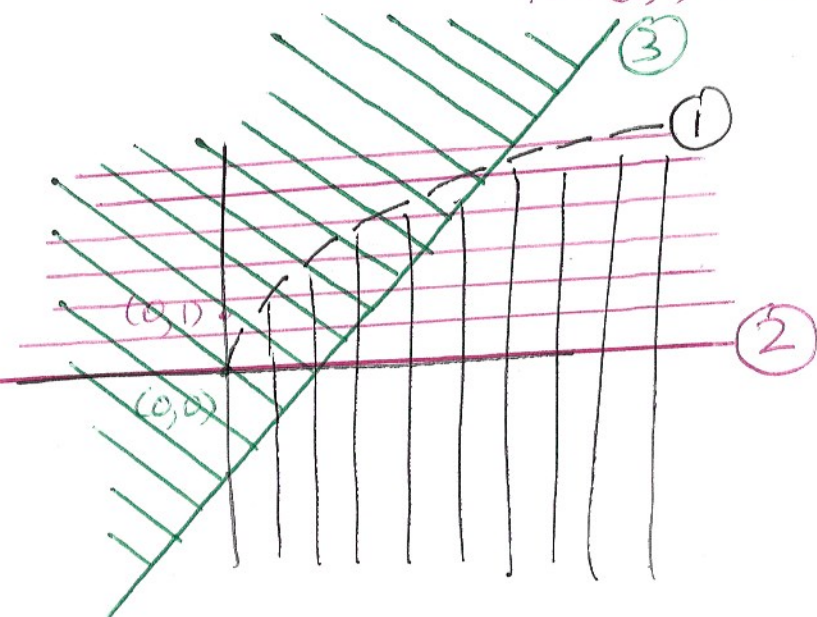
SKETCH THE SOL'N SET OF THE SYSTEM + FIND THE VERTICES
(ALGEBRAICALLY)

$$y < \sqrt{x} \text{ AND } y \geq 0 \text{ AND } x - y \leq 2$$

↓ ①
 $y = \sqrt{x}$

↓ ②
 $y = 0$
TEST (0,1) $1 \geq 0 \checkmark$

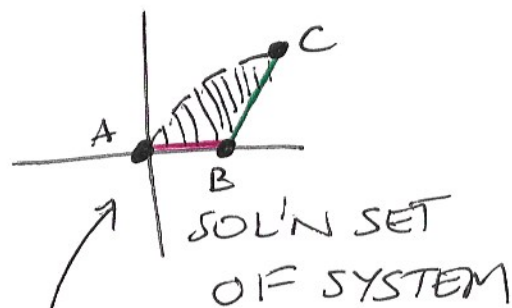
↓ ③
 $x - y = 2 \rightarrow x - 2 = y$
TEST (0,0) $0 - 0 \leq 2 \rightarrow 0 \leq 2 \checkmark$



A (0,0)

B $y = 0$ AND $y = x - 2$
 $0 = x - 2 \rightarrow x = 2$ (2,0)

C $y = \sqrt{x}$ AND $y = x - 2$



VERTEX/VERTICES
OF SOL'N SET

(INTERSECTION OF
2 DIFFERENT EQUALITIES
ON BOUNDARY OF
SOL'N SET)

$$y = \sqrt{x} \text{ AND } y = x - 2$$

$$(\sqrt{x})^2 = (x-2)^2$$

$$x = x^2 - 4x + 4$$

$$0 = x^2 - 5x + 4 = (x-1)(x-4)$$

$$x = 1, 4$$

EXTRANEIOUS
SOL'N (NOT A

$x=1$ SOL'N BUT

$x=4$

$$\sqrt{x} = \sqrt{1} = 1$$

WORK IS
CORRECT

$$\sqrt{4} = 2$$

$$x-2 = 1-2 = -1$$

$$4-2 = 2$$

$C(4, 2)$

$$5 \neq -5$$

$$(5)^2 = (-5)^2$$

