

Show work:

1. Consider the plane set  $\{(x,y) : y \geq x^2\}$ . Check all that apply:

- |                                     |                      |                                     |                                  |
|-------------------------------------|----------------------|-------------------------------------|----------------------------------|
| <input checked="" type="checkbox"/> | Bounded below        | <input checked="" type="checkbox"/> | Symmetric with respect to x-axis |
| <input type="checkbox"/>            | Bounded to the left  | <input type="checkbox"/>            | " " " " y-axis                   |
| <input type="checkbox"/>            | Bounded to the right | <input type="checkbox"/>            | " " " " $y = x$                  |
| <input type="checkbox"/>            | Bounded above        | <input type="checkbox"/>            | " " " " (0,0)                    |
| <input type="checkbox"/>            | Bounded              |                                     |                                  |

2. Find the equation of the straight line which is perpendicular to the line

$$2x + 3y + 1 = 0$$

at the point (1, -1).

$$m_1 = -\frac{2}{3} \quad m_2 = \frac{3}{2}$$



$$y = \frac{3}{2}x + b$$

$$-1 = \frac{3}{2} + b$$

$$3x - 2x - \frac{5}{2} = 0$$

$$b = -\frac{5}{2}$$

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

3. Consider the function  $f(x) = 1 + \sqrt{x-1}$ .

a) What is the domain of f?

$$x-1 \geq 0 \quad x \geq 1$$

$$[1, \infty)$$

b) What is the range of f?

$$y = 1 + \sqrt{x-1}$$

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

$$y-1 = \sqrt{x-1} \quad y \geq 1$$

$$(y-1)^2 = x-1 \quad y \geq 1$$

$$[1, \infty)$$

c) Is f 1-1?

YES

d) f is bounded below  
 bounded above

YES

NO



4. Consider the function  $g(x) = \frac{1}{x-1}$

a) Find  $g^{-1}$ .

$$y = \frac{1}{x-1}$$

$$x-1 = \frac{1}{y}$$

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

$$g^{-1}(y) = 1 + \frac{1}{y}$$

b) What is the domain of  $g \circ g$ ?

$$(g \circ g)(x) = g\left(\frac{1}{x-1}\right) = \frac{1}{\frac{1}{x-1} - 1}$$

$$\sum x: \left. \begin{array}{l} x \neq 2 \\ x \neq 1 \end{array} \right\}$$

$$x \neq 1$$

$$\frac{1}{x-1} \neq 1$$

$$x-1 \neq 1$$

$$x \neq 2$$

c)  $f \circ g(x) =$

*credit*

$$f(g(x)) = f\left(\frac{1}{x-1}\right) = 1 + \sqrt{\frac{1}{x-1} - 1}$$

5. Find the solution set of

$$(x-1)(x+3) > 0.$$

$$\text{I } x-1 > 0 \quad x+3 > 0$$

$$x > 1 \quad x > -3 \Rightarrow x > 1$$

$$\text{II } x-1 < 0 \quad x+3 < 0$$

$$x < 1 \quad x < -3 \Rightarrow x < -3$$

$$(-\infty, -3) \cup (1, \infty)$$

6. Find the solution set of

$$|2x+5| \leq 2.$$

$$-2 \leq 2x+5 \leq 2$$

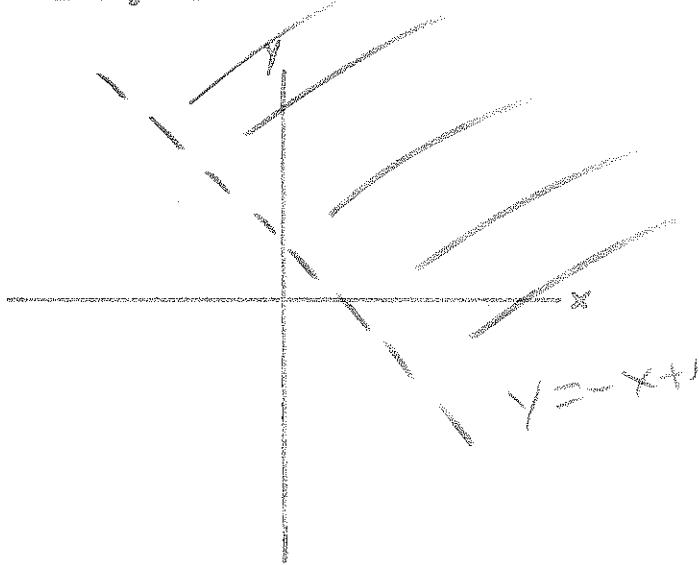
$$-7 \leq 2x \leq -3$$

$$-\frac{7}{2} \leq x \leq -\frac{3}{2}$$

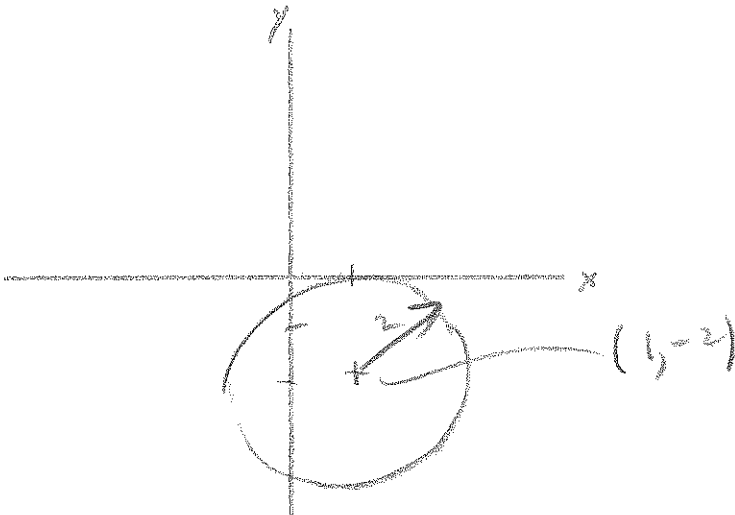
$$\left[-\frac{7}{2}, -\frac{3}{2}\right]$$

Carefully sketch that following graphs

7.  $x + y > 1$



8.  $(x-1)^2 + (y+2)^2 \leq 4$



9.  $|x|/|y| = 1$

