

Please answer all questions in the given “Blue Book”, except for those that ask for the sketch of a graph. Show any relevant work used in arriving at an answer, but be sure to clearly mark that answer.

1. Given are expressions involving intervals. For each one, show an equivalent expression involving inequalities.

(a)  $x$  is in  $(1, \sqrt{3}]$

(b)  $x$  is in  $(-\infty, -2) \cup [0, 8)$

2. Given are expressions involving inequalities. For each one, show an equivalent expression involving intervals.

(a)  $0 \leq x < 13$

(b)  $x \leq 0$  or  $3 < x < 4$

(c)  $x \neq 0$

3. For each inequality, use interval notation to describe the set of all  $x$  satisfying it.

(a)  $(x - 3)(x - 2)(x + 4) < 0$

(b)  $|2x + 3| > 7$

4. Describe (using interval notation or inequalities) the domain of the given function. For a small bonus, also describe its range.

$$f(x) = \sqrt{\frac{x-1}{x-3}}$$

5. Consider the pair of points  $(-2, 5)$  and  $(2, -1)$ .

(a) What is the length of the line segment connecting these two points?

(b) What is the midpoint of the line segment connecting these two points?

(c) What is the slope-intercept equation of the line passing through these two points?

6. Consider the line described by the equation  $2x + y + 4 = 0$ .

(a) Determine the slope-intercept equation of the line that is perpendicular to it and that passes through the point  $(3, 4)$ .

(b) In the space below, sketch both lines (i.e., the given one and the one described in (a)).

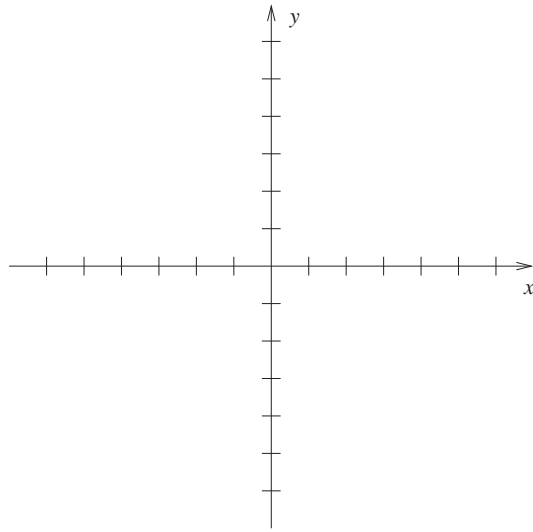
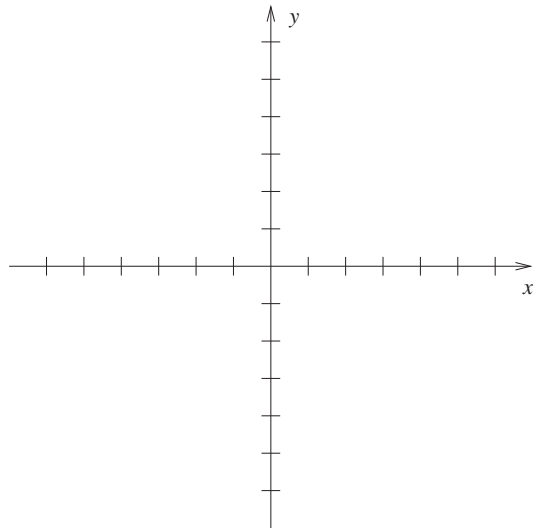


Figure 1: Answer for 6(b)

7. Consider the parabola described by the equation  $y = -x^2 + 2x + 3$ .

- (a) Determine the Vertex Form equation of this parabola.
- (b) Sketch its graph in the space below.
- (c) Determine the domain and range of the function described by this equation.



8. Consider the circle described by the equation  $x^2 + 6x + y^2 - 2y - 6 = 0$ .

(a) Determine the standard form equation of this circle.

(b) Sketch its graph in the space below.

