

## E Summer Inequality Regions

1. Shade the regions in the  $xy$ -plane which satisfy the following inequalities:

(a)  $1 \leq x \leq 2$  and  $-1 \leq y \leq 3$ .

$$(1, -1), (2, -1), (2, 3), (1, 3)$$

(b)  $x \geq 0$  and  $y \geq 0$  and  $y \leq -3x + 7$ .

$$(0, 0), (0, 7), (\frac{7}{3}, 0)$$

(c)  $x \geq 0$  and  $y \geq 1$  and  $2x + y \leq 8$ .

$$(0, 1), (0, 8), (\frac{7}{2}, 1)$$

(d)  $y \leq x$  and  $y \geq -1$  and  $x + y \leq 6$ .

$$(-1, -1), (3, 3), (7, -1)$$

(e)  $x \geq 1$  and  $x + y \leq 8$  and  $y \geq 2x - 3$ .

$$(1, -1), (1, 7), (\frac{11}{3}, \frac{13}{3})$$

(f)  $2y \geq x$  and  $x + y \leq 8$  and  $y \leq 2x$ .

$$(0, 0), (\frac{8}{3}, \frac{16}{3}), (\frac{16}{3}, \frac{8}{3})$$

(g)  $y \leq x + 6$  and  $y \geq 4x + 6$  and  $2x + y + 4 \geq 0$ .

$$(0, 6), (-\frac{10}{3}, \frac{8}{3}), (-\frac{5}{3}, -\frac{2}{3})$$

2. Find the sets of inequalities that define the following triangles:

(a)  $(1, 0)$ ,  $(1, 5)$  and  $(6, 0)$ .

$$x + y \leq 6, y \geq 0, x \geq 1$$

(b)  $(0, 0)$ ,  $(0, 5)$  and  $(-10, 0)$ .

$$x \leq 0, y \geq 0, 2y \leq x + 10$$

(c)  $(-1, -1)$ ,  $(-2, -1)$  and  $(-1, -3)$ .

$$y \leq -1, x \leq -1, 2x + y + 5 \geq 0$$

(d)  $(4, 5)$ ,  $(-1, 0)$  and  $(3, -1)$ .

$$y \geq 6x - 19, y \leq x + 1, x + 4y + 1 \geq 0$$

(e)  $(5, 1)$ ,  $(-3, -1)$  and  $(2, -3)$ .

$$4y \leq x - 1, 3y \geq 4x - 17, 2x + 5y + 11 \geq 0$$

3. Find the inequality that describes the area above the line  $y = 5$ .

$$y > 5$$

4. Find the inequality that describes the area to the left of the line  $x = -1$ .

$$x < -1$$

5. Find the triple inequality that describes the area in between the lines  $x = 0$  and the line  $x = 7$ .

$$0 < x < 7$$

6. Find the triple inequality that describes the area in between the lines  $y = \frac{1}{2}$  and the line  $y = 2$ .

$$\frac{1}{2} < y < 2$$

7. Find the triple inequality that describes the area in between the lines  $x = \pi$  and the line  $x = 2\pi$ .

$$\pi < x < 2\pi$$

8. Find the two triple inequalities that describe the interior of the rectangle formed by the points  $(-1, 3)$ ,  $(-1, 5)$ ,  $(2, 5)$  and  $(2, 3)$ .

$$-1 < x < 2 \text{ and } 3 < y < 5$$

9. Find the two triple inequalities that describe the interior of the rectangle formed by the points  $(1, 0)$ ,  $(1, 4)$ ,  $(4, 4)$  and  $(4, 0)$ .

$$1 < x < 4 \text{ and } 0 < y < 4$$

10. Find the two triple inequalities that describe the interior of the rectangle formed by the points  $(\frac{1}{3}, -1)$ ,  $(\frac{1}{3}, 2)$ ,  $(\frac{5}{2}, 2)$  and  $(\frac{5}{2}, -1)$ .

$$\frac{1}{3} < x < \frac{5}{2} \text{ and } -1 < y < 2$$

11. Find the inequalities that describe the interior of the triangle formed by the points  $(0, 0)$ ,  $(2, 0)$  and  $(0, 2)$ .

$$x > 0 \text{ and } y > 0 \text{ and } x + y < 2$$

12. Find the inequalities that describe the interior of the triangle formed by the points  $(0, 0)$ ,  $(3, 0)$  and  $(0, -3)$ .

$$x > 0 \text{ and } y < 0 \text{ and } y > x - 3$$

13. Find the inequalities that describe the interior of the triangle formed by the points  $(0, 0)$ ,  $(-4, 0)$  and  $(0, -4)$ .

$$x < 0 \text{ and } y < 0 \text{ and } x + y + 4 > 0$$

14. Find the inequalities that describe the interior of the triangle formed by the points  $(0, 0)$ ,  $(2, 0)$  and  $(0, 4)$ .  $x > 0$  and  $y > 0$  and  $2x + y < 4$
15. Find the inequalities that describe the interior of the triangle formed by the points  $(0, 0)$ ,  $(0, 1)$  and  $(-3, 0)$ .  $x < 0$  and  $y > 0$  and  $3y < x + 3$
16. Find the inequalities that describe the interior of the triangle formed by the points  $(1, 1)$ ,  $(5, 1)$  and  $(5, 3)$ .  $x < 5$  and  $y > 1$  and  $2y < x + 1$
17. Find the inequalities that describe the interior of the triangle formed by the points  $(2, 3)$ ,  $(4, 3)$  and  $(3, 4)$ .  $y > 3$  and  $x + y < 7$  and  $y < x + 1$
18. Find the inequalities that describe the interior of the triangle formed by the points  $(-2, 3)$ ,  $(2, 3)$  and  $(0, 2)$ .  $y < 3$  and  $2y > x + 4$  and  $x + 2y > 4$
19. HARDER. Shade the following regions:
- (a)  $1 \leq xy \leq 2$ .