PLOT LINES → FIND AREA
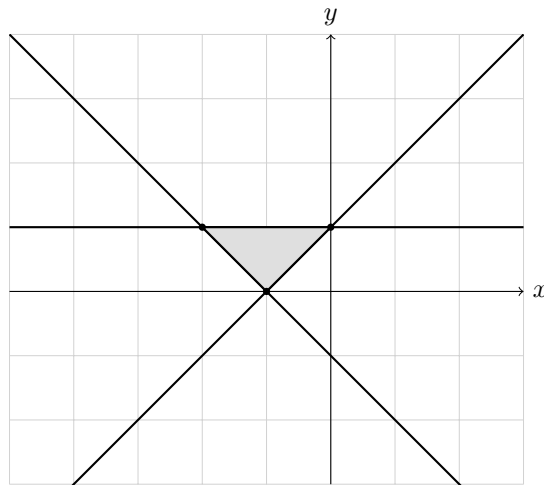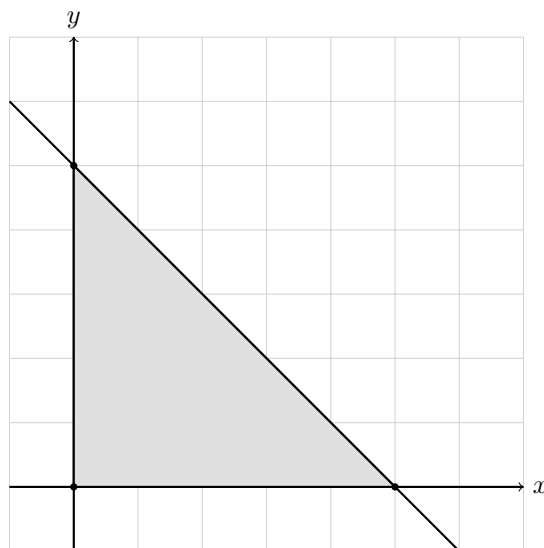
Math 10 · Mr. Merrick · January 15, 2026
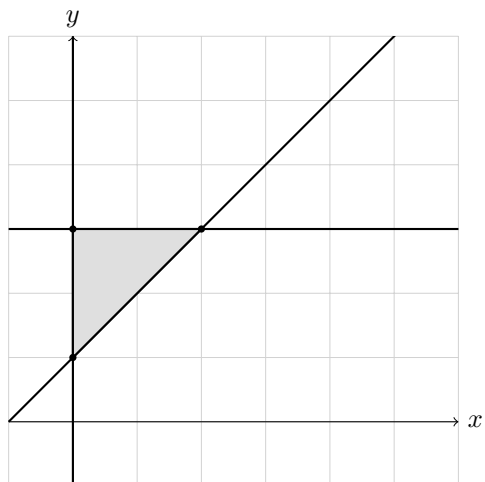
For each question:

- Plot all given lines on the Cartesian plane.

- Identify the enclosed region(s).

- Find the area. (Use horizontal bases and vertical heights.)

1. Plot $y = 1$, $y = x + 1$, and $y = -x - 1$. Find the area of the region they enclose. [Intersections: $(-2, 1)$, $(0, 1)$, $(-1, 0)$. Base on $y = 1$: 2. Height: 1. Area $= \frac{1}{2}(2)(1) = 1$.]
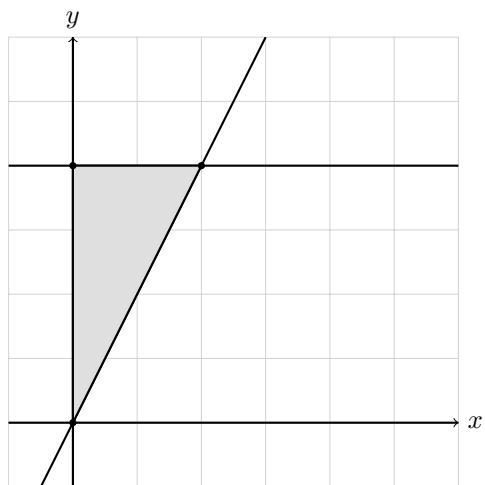

2. Plot $x = 0$, $y = 0$, and $y = -x + 5$. Find the area of the region they enclose. [Vertices: $(0, 0)$, $(0, 5)$, $(5, 0)$. Base $= 5$, height $= 5$. Area $= \frac{1}{2}(5)(5) = 12.5$.]
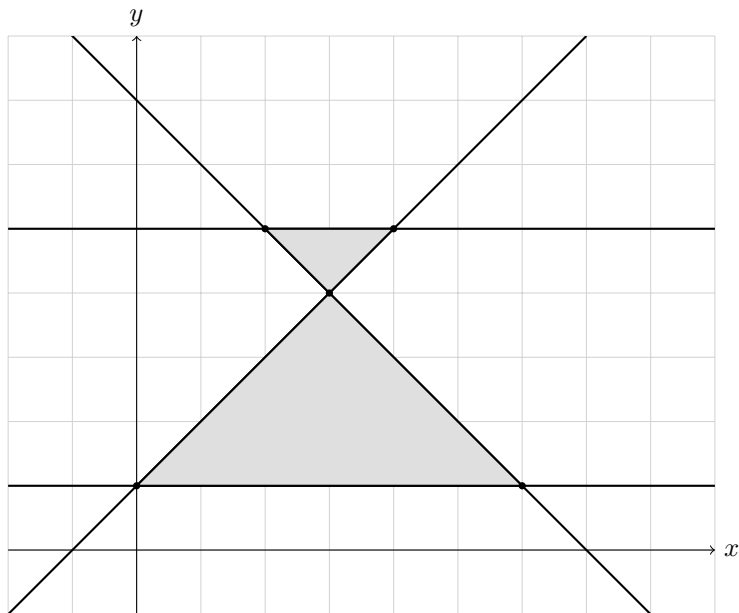
3. Plot $x = 0$, $y = 3$, and $y = x + 1$. Find the area of the region they enclose. [Vertices: $(0, 1)$, $(0, 3)$, $(2, 3)$. Base on $y = 3$: 2. Height: 2. Area $= \frac{1}{2}(2)(2) = 2$.]
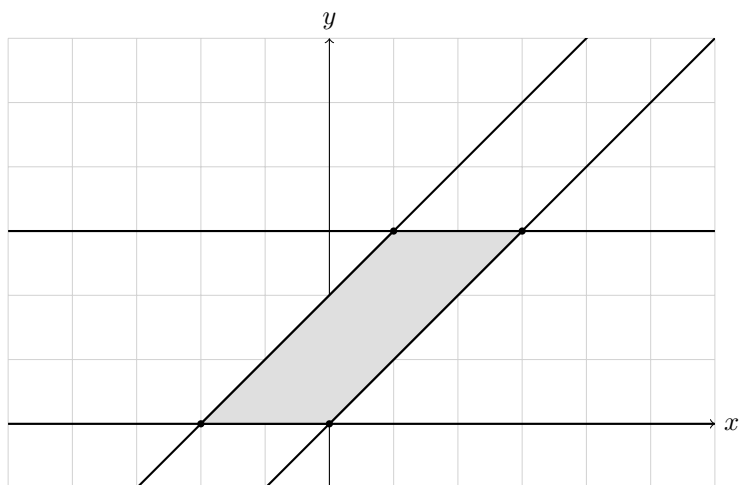

4. Plot $x = 0$, $y = 0$, $y = 4$, and $y = 2x$. Find the area of the region they enclose. [Vertices: $(0, 0)$, $(0, 4)$, $(2, 4)$. Base on $y = 4$: 2. Height: 4. Area $= \frac{1}{2}(2)(4) = 4$.]
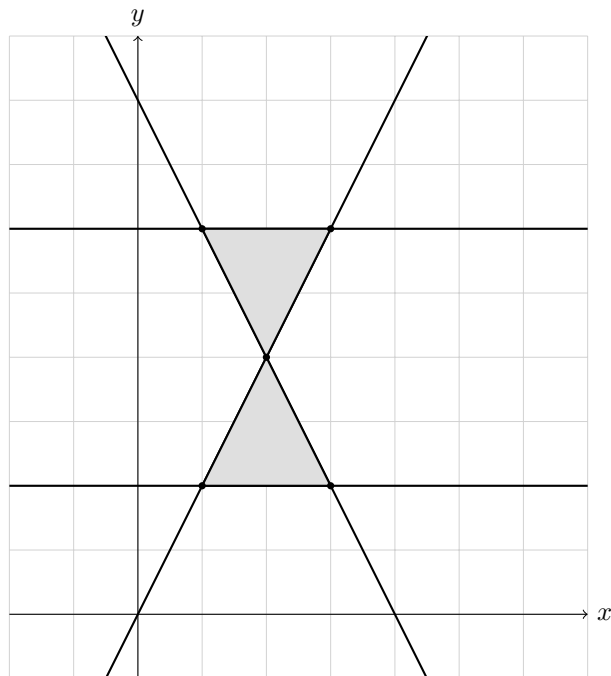
5. Plot $y = 1$, $y = 5$, $y = x + 1$, and $y = -x + 7$. Find the area of the region(s) they enclose. [The slanted lines intersect at $x + 1 = -x + 7 \Rightarrow x = 3$, $y = 4$. There are two bounded triangles. Top triangle: vertices $(2, 5), (4, 5), (3, 4)$. Base $= 2$, height $= 1$, area $= \frac{1}{2}(2)(1) = 1$. Bottom triangle: vertices $(0, 1), (6, 1), (3, 4)$. Base $= 6$, height $= 3$, area $= \frac{1}{2}(6)(3) = 9$. Total bounded area $= 1 + 9 = 10.$]

6. Plot $y = 0$, $y = 3$, $y = x$, and $y = x + 2$. Find the area of the region they enclose. [At $y = 0$: points $(0, 0)$ and $(-2, 0)$. At $y = 3$: points $(3, 3)$ and $(1, 3)$. Bases: 2 and 2. Height $= 3$. Area $= \frac{1}{2}(2 + 2)(3) = 6.$]

7. Plot $y = 2$, $y = 6$, $y = 2x$, and $y = -2x + 8$. Find the area of the region(s) they enclose. [The slanted lines intersect at $2x = -2x + 8 \Rightarrow x = 2$, $y = 4$. There are two bounded triangles. Top triangle: vertices $(1, 6), (3, 6), (2, 4)$. Base $= 2$, height $= 2$, area $= \frac{1}{2}(2)(2) = 2$. Bottom triangle: vertices $(1, 2), (3, 2), (2, 4)$. Base $= 2$, height $= 2$, area $= \frac{1}{2}(2)(2) = 2$. Total bounded area $= 2 + 2 = 4$.]

8. Plot $y = 1$, $y = 4$, $x = -1$, and $y = -x + 3$. Find the area of the region they enclose. [Triangle with vertices $(-1, 1)$, $(2, 1)$, $(-1, 4)$. Base $= 3$. Height $= 3$. Area $= \frac{1}{2}(3)(3) = 4.5$.]