Written Homework Problems §5.1

5 problems for 10 points

§5.1 #(12,14,15)**, 35, 39

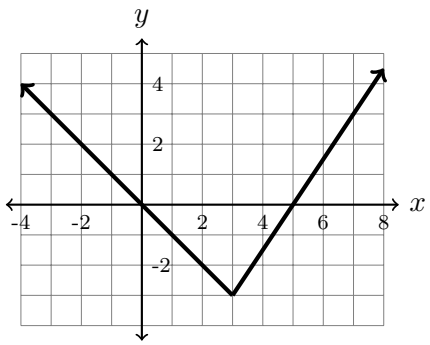
** For all of these problems, use technology to draw the graph of the function over the given interval. Add to your graph the rectangles corresponding the left- or right-handed sums. For each example, decide if you think your estimate is an over-estimate, an underestimate, or hard to determine.

Additional Problems. Remember that we are computing the *signed area* between a curve and the x-axis. If the area is below the x-axis, then the sign of the area is negative, and if the area is above the x-axis then the sign of the area is positive.

Problem A. A portion of the piecewise-linear function

$$f(x) = \begin{cases} -x & x \leq 3 \\ \frac{3}{2}(x-5) & x > 3 \end{cases}$$

is graphed below.

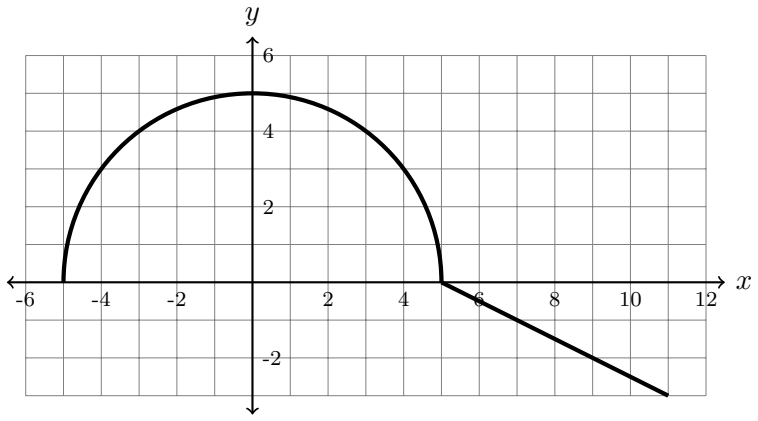


Approximate $\int_{-2}^{7} f(x)\,dx$ using three left-hand rectangles. **Draw** the rectangles on the graph. Then **use geometry** to compute $\int_{-2}^{7} f(x)\,dx$ exactly.

Problem B. A portion of the function

$$f(x) = \begin{cases} \sqrt{25-x^2} & -5 \leq x \leq 5 \\ -\frac{1}{2}(x-5) & x \geq 5 \end{cases}$$

is graphed below.



Approximate $\int_0^9 f(x)\,dx$ using three right-hand rectangles. Carefully draw the three right-hand rectangles on the graph. Lightly shade them in. Then use geometry to compute $\int_0^9 f(x)\,dx$ exactly.

Problem C. The function $f(x) = 2 - 2\ln(x)$ is graphed below. We want to estimate the area between the curve $f(x)$ and the x-axis on the interval $[1, 9]$ using L_4. (That is, we want to use 4 approximating rectangles and left-hand end points.) Sketch the four approximating rectangles on the graph. Then do a calculation to estimate the area under the curve using L_4 (that is, use 4 approximating rectangles and left-hand end points) and simplify your answer. *Note: You are obviously not expected to compute things like* $\ln(4)$ *without a calculator. It is acceptable to have numbers like this in your final answer.*