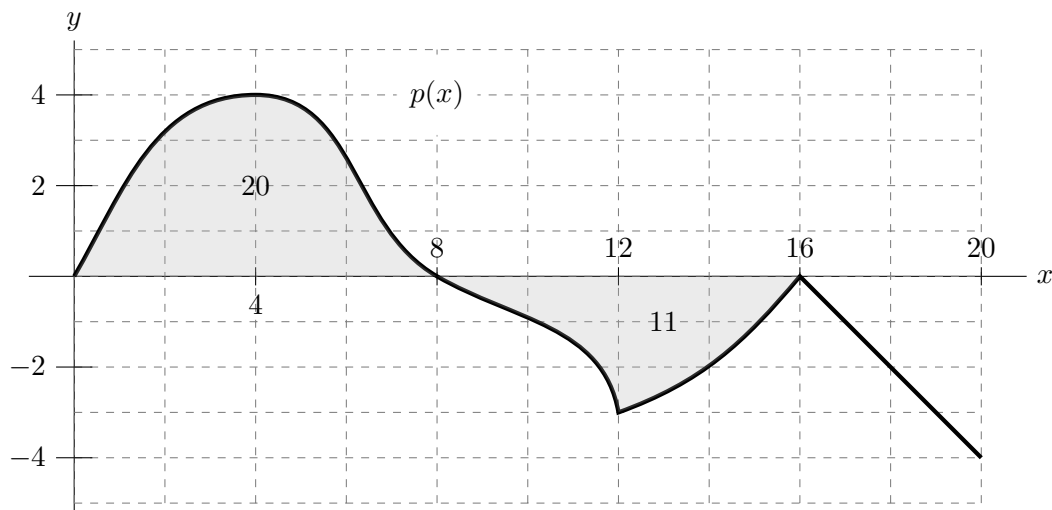


1. [12 points] Recall that a function  $h$  is odd if  $h(-x) = -h(x)$  for all  $x$ . A portion of the graph of  $p(x)$ , an odd function, is shown below. Assume that the areas of the two shaded regions are 20 and 11, as indicated on the graph, and note that  $p(x)$  is linear for  $16 < x < 20$ .



Remember to show your work throughout this problem.

- a. [4 points] Compute the exact value of  $\int_0^{20} (5 - 3p(x)) dx$ .

**Answer:** \_\_\_\_\_

- b. [2 points] Compute the exact value of  $\int_4^8 p'(x) dx$ .

**Answer:** \_\_\_\_\_

- c. [3 points] Find the average value of  $p(x)$  on the interval  $-16 \leq x \leq 8$ .

**Answer:** \_\_\_\_\_

- d. [3 points] Use a right Riemann sum with 3 equal subintervals to estimate  $\int_{12}^{18} p(x) dx$ . Write out all terms of the sum.

**Answer:**  $\int_{12}^{18} p(x) dx \approx$  \_\_\_\_\_