

**DIRECTIONS** To receive full credit, you must provide complete legible solutions to the following problems in the space provided. Transfer all your answers to the space provided on the test paper.

1. The table shows values of a force function  $f(x)$ , where  $x$  is measured in meters and  $f(x)$  in newtons.

$x$	5	9	13	17	21	25	29	33	37
$f(x)$	5	5.8	7.1	8.6	9.7	8.1	6.7	5.5	4.1

- a. Find the average value of the force function over the interval  $[5,37]$
- b. Use the average force function to estimate the work done to move an object from  $x = 5$  to  $x = 37$ .
- c. Use sine regression function to find a sine function that best fits the data, then use it to compute the work done by the force function to move the object from  $x = 5$  to  $x = 37$ .
- d. How does answers to part b and c compare?
2. Find the average value have of the function  $h$  on the given interval.  
 $h(u) = (15 - 13u)^{-1}$ ,  $[-1, 1]$       Ans \_\_\_\_\_

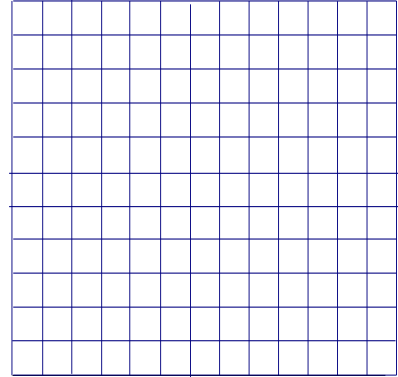
3. Consider the given function and the given interval.

$$f(x) = 12 \sin x - 6 \sin(2x), \quad [0, \pi]$$

a. Find the average value  $f_{\text{ave}}$  of  $f$  on the given interval.

b. Find  $c$  such that  $f_{\text{ave}} = f(c)$ . (Round your answers to three decimal places.)

c. Sketch the graph of  $f$  and a rectangle whose area is the same as the area under the graph of  $f$ .



4. a. Use the mean value theorem for integrals to find a Riemann sum of size two whose sum is equal to the total area under the given curve over the specified interval

$$f(x) = \frac{1}{x}, \quad 1 \leq x \leq 3$$

b. Sketch the graph of  $f$  and the rectangles whose sum area is the same as the area under the graph of  $f$ .

