**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.   Use the Midpoint Rule to estimate the area under the graph of

$$f(x) = \frac{1}{x}, \text{ from } x = 1 \text{ to } x = 2$$

using the following methods:

a.   Using hand computations and four rectangles. Illustrate your method using the graph of f.
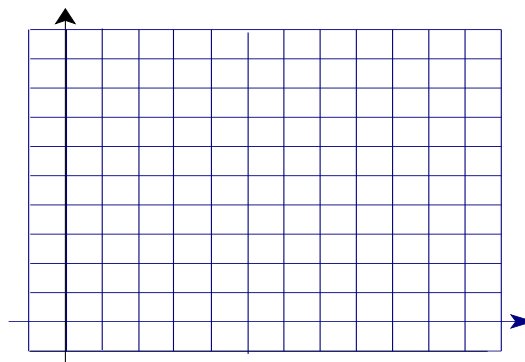
b.Using a calculator with a partition of size 10.
Show the Calculator Instructions.

Ans_____

c.   Using a calculator with a partition of size 100. Show the Calculator Instructions.

Ans_____

2.   Given $f(x) = x^2$, $0 \le x \le 10$ Find the exact value of each:

a) $L_{10} =$

Ans_____

b) $R_{10} =$ Ans_____

c) $M_{10} =$ Ans_____

3   The speed of a runner increased steadily during the first three seconds of a race. Her speed at half-second intervals is given in the table. Find lower and upper estimates for the distance that she traveled during these three seconds.

t(s)	0	0.5	1.0	1.5	2.0	2.5	3.0
v(ft/s)	0	6.2	10.8	14.9	18.1	19.4	20.2

Ans_____

4.   The velocity graph of a car accelerating from rest to a speed of 105 km/h over a period of 30 seconds is shown. Estimate the distance traveled during this period. (Use M_6 to get the most precise estimate. Round your answer to two decimal places.)

Ans_____

v (km/h)

105

70

35

0   10   20   30   t (seconds)
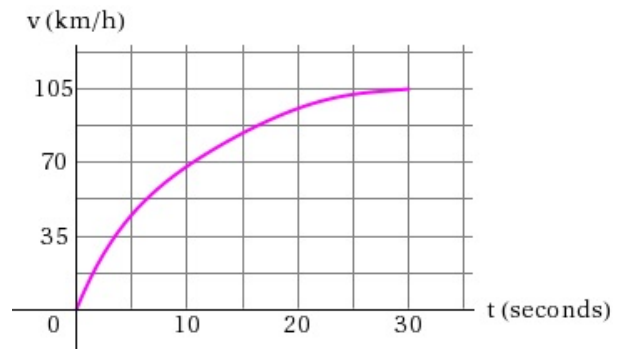
5.   The area A of the region S that lies under the graph of the continuous function is the limit of the sum of the areas of approximating rectangles.

Use a Riemann sum to find an expression for the area under the graph of f as a limit. Do not evaluate the limit.

$f(x) = \sqrt{6x}$ $,1 \le x \le 14$ Ans_____