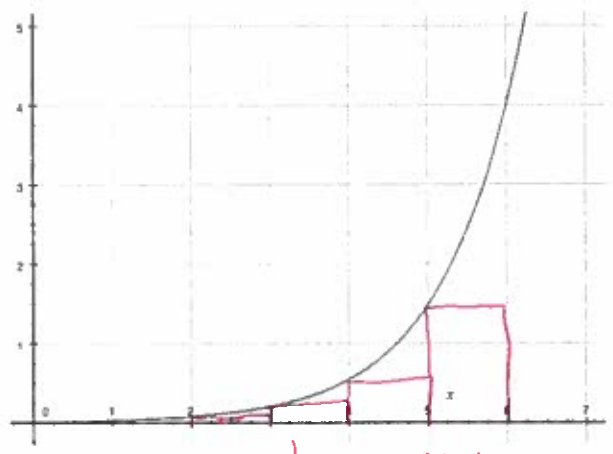


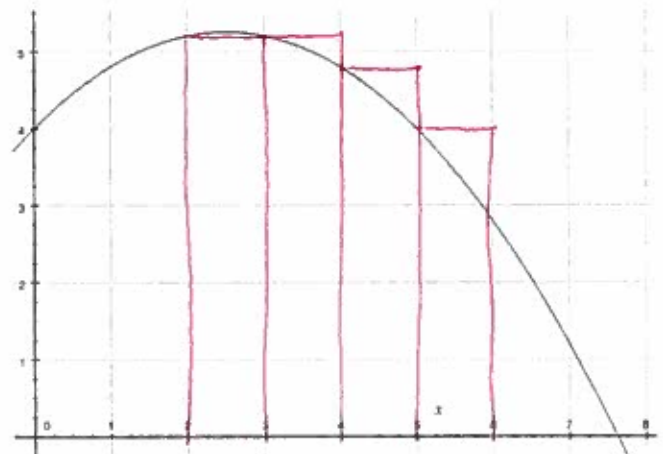
Whose name goes here? Key

### AP Calculus AB: 7.2 Left & Right-hand Rule

1. Draw a left-hand approximation for the estimate of the integral of the functions below for the intervals [2,6] using 4 rectangles. And state whether they are over or under estimates for the exact area under the curve.



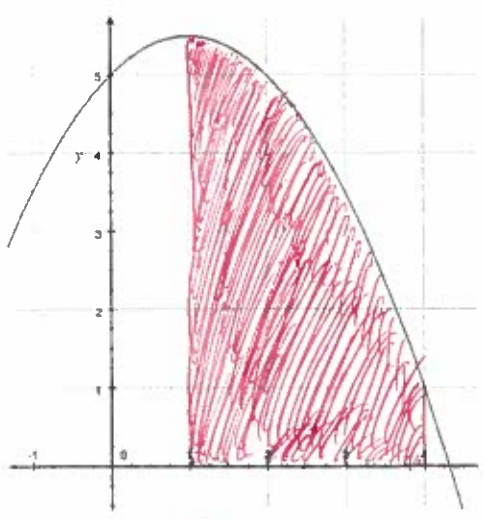
under approx



over approx

2. Approximate the area under the curve for the function  $f(x) = -0.5x^2 + x + 10$  for the interval [1,4].

a) Shade in what the question is asking you to find on the graph below.



b) using 3 rectangles estimate the area of the function to the left using right-hand rule. (Ans: 24.5)

$$b = \frac{4-1}{3} = 1$$
$$A = 1[f(2) + f(3) + f(4)]$$
$$A = 1[10 + 8.5 + 6] = \boxed{24.5}$$

c) using ~~3~~<sup>6</sup> rectangles estimate the integral of the area above. left-hand (Ans: 28.063)

$$b = \frac{4-1}{6} = .5$$
$$A = .5[f(1) + f(1.5) + \dots + f(3.5)]$$
$$= \boxed{28.063}$$

right-hand (Ans: 25.813)

$$A = .5[f(4) + f(3.5) + \dots + f(1.5)]$$
$$= \boxed{25.813}$$

Whose name goes here? \_\_\_\_\_

3. Approximate the area under the curve for the function  $f(x) = \sqrt{x}$  using both the right and left hand rule for the interval  $[2,6]$ .

a) using 4 rectangles

left-hand (Ans: 7.382)

$$b = \frac{6-2}{4} = 1$$

$$A = 1[f(2) + f(3) + f(4) + f(5)]$$
$$= \boxed{7.382}$$

right-hand (Ans: 8.418)

$$A = 1[f(6) + f(5) + f(4) + f(3)]$$

$$A = \boxed{8.418}$$

b) Which type of approximations was an over approximation for the area under the curve?



Right-Hand rule was an over approximation because the function is increasing

4. Approximate the integral of the function below using the left-hand rule with 4 rectangles on the interval  $[2,10]$  (Ans: 224)

x	2	4	6	8	10
f(x)	13	23	45	31	20

$$b = \frac{10-2}{4} = 2$$

$$A = 2[f(2) + f(4) + f(6) + f(8)] = 2[13 + 23 + 45 + 31] = \boxed{224}$$

b) using the table above estimate the area between the x-axis and the function over the interval  $[2,10]$  using the right-hand rule and 2 rectangles. (Ans: 260)

$$b = \frac{10-2}{2} = 4$$

$$A = 4[f(10) + f(6)] = 4[20 + 45] = \boxed{260}$$

5. Estimate the area under the curve of the function  $g(x)$  using the table below with the right-hand rule and 4 rectangles. (Hint: the bases are not of equal value here)

(Ans: 75)

x	0	2	3	6	7
g(x)	2	12	13	10	8

$$A = 2(12) + 1(13) + 3(10) + 1(8) = \boxed{75}$$