

1) Find the Sum $\sum_{k=3}^6 \frac{5}{2^k - 3k^2}$

2) Use Sigma Notation to write the sum $\frac{2}{2-3} + \frac{3}{2-9} + \frac{4}{2-27} + \cdots + \frac{8}{2-2187}$

3) Use properties of summation to evaluate the sum:

$$\sum_{i=1}^{31} 2(i-1)^2$$

4) Use Left, Middle, and Right endpoints to find approximations of area of region between the graph and the x-axis: $f(x) = 1 + 3x^2$ in interval $[1, 5]$ using 3 rectangles

a) Left endpoint (LRAM):

b) Right Endpoint (RRAM):

c) Middle rectangle (MRAM):

5) Selected values of a function, f , are given in the table below:

x	1	2	5	7	8	12	15	19	22
f(x)	2	3	7	4	11	19	8	1	5

a) Give the middle approximation with 2 subintervals for f on the interval $[1, 22]$

x	1	2	5	7	8	12	15	19	22
f(x)	2	3	7	4	11	19	8	1	5

b) Use right-handed rectangles to approximate the area with 3 subintervals for f on the interval $[2, 19]$

x	1	2	5	7	8	12	15	19	22
f(x)	2	3	7	4	11	19	8	1	5

c) Use left-handed rectangles to approximate the area with 4 subintervals for f on the interval $[7, 19]$

x	1	2	5	7	8	12	15	19	22
f(x)	2	3	7	4	11	19	8	1	5

d) Use trapezoids to approximate the area with 3 subintervals for f on the interval $[5, 22]$

1) Find the Sum $\sum_{k=3}^6 \frac{5}{2^k - 3k^2}$

$$\frac{5}{2^3 - 3(3)^2} + \frac{5}{2^4 - 3(4)^2} + \frac{5}{2^5 - 3(5)^2} + \frac{5}{2^6 - 3(6)^2} = \frac{-5}{19} + \frac{-5}{32} - \frac{5}{43} + \frac{-5}{44} = \boxed{-0.649}$$

2) Use Sigma Notation to write the sum $\frac{2}{2-3} + \frac{3}{2-9} + \frac{4}{2-27} + \dots + \frac{8}{2-2187}$

$$\sum_{i=1}^7 \frac{i+1}{2-3^i}$$

3) Use properties of summation to evaluate the sum:

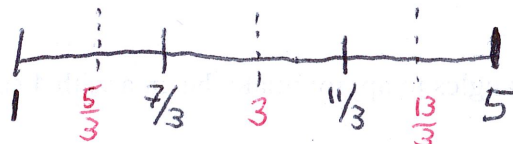
$$\sum_{i=1}^{31} 2(i-1)^2 = \sum 2(i-1)(i-1) = \sum 2(i^2 - 2i + 1) = \sum 2i^2 - 4i + 2$$

$$\sum 2i^2 - \sum 4i + \sum 2 \quad \left| \quad 2 \left[\frac{n(n+1)(2n+1)}{6} \right] - 4 \left[\frac{n(n+1)}{2} \right] + 2[n] \quad \left| \begin{array}{l} 20832 \\ -1984 \\ +62 \\ \hline 18910 \end{array} \right.$$

$$2 \left[\sum i^2 \right] - 4 \left[\sum i \right] + 2 \left[\sum 1 \right] \quad \left| \quad 2 \left[\frac{(31)(32)(63)}{6} \right] - 4 \left[\frac{31(32)}{2} \right] + 2(31) \quad \left| \begin{array}{l} 20832 \\ -1984 \\ +62 \\ \hline 18910 \end{array} \right.$$

4) Use Left, Middle, and Right endpoints to find approximations of area of region between the graph and the x-axis: $f(x) = 1 + 3x^2$ in interval $[1, 5]$ using 3 rectangles

$$W = \frac{b-a}{n} = \frac{5-1}{3} = \frac{4}{3}$$



$$1 + \frac{7}{3} = \frac{10}{3} \cdot \frac{1}{2} = \frac{5}{3}$$

$$\frac{7}{3} + \frac{11}{3} = \frac{18}{3} \cdot \frac{1}{2} = 3$$

$$\frac{11}{3} + 5 = \frac{26}{3} \cdot \frac{1}{2} = \frac{13}{3}$$

a) Left endpoint (LRAM):

$$\text{Area} \approx \frac{4}{3} \cdot f(1) + \frac{4}{3} \cdot f\left(\frac{7}{3}\right) + \frac{4}{3} \cdot f\left(\frac{11}{3}\right) \quad \left| \quad = \frac{752}{9} \approx 83.556$$

$$= \frac{4}{3} \left[4 + \frac{52}{3} + \frac{124}{3} \right]$$

b) Right Endpoint (RRAM):

$$\text{Area} \approx \frac{4}{3} \left[f\left(\frac{7}{3}\right) + f\left(\frac{11}{3}\right) + f(5) \right] \quad \left| \quad = \frac{1616}{9} \approx 179.556$$

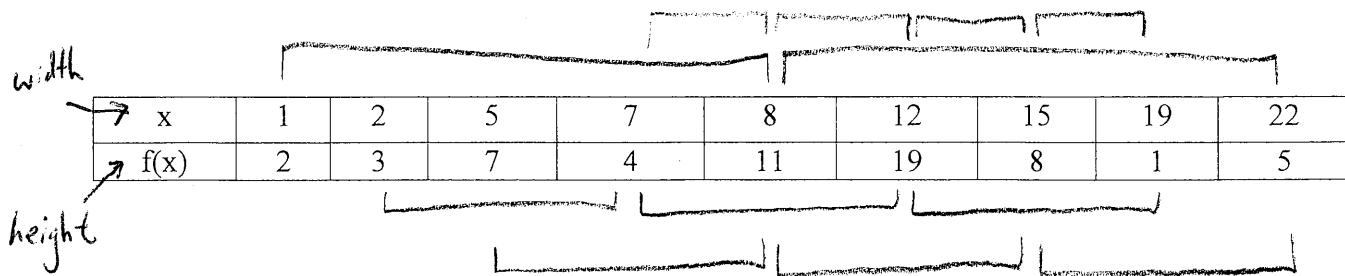
$$= \frac{4}{3} \left[\frac{52}{3} + \frac{124}{3} + 76 \right]$$

c) Middle rectangle (MRAM):

$$\text{Area} \approx \frac{4}{3} \left[f\left(\frac{5}{3}\right) + f(3) + f\left(\frac{13}{3}\right) \right] \quad \left| \quad = \frac{1136}{9} \approx 126.222$$

$$= \frac{4}{3} \left[\frac{28}{3} + 28 + \frac{172}{3} \right]$$

5) Selected values of a function, f , are given in the table below:



a) Give the middle approximation with 2 subintervals for f on the interval $[1, 22]$

$$\begin{aligned} \text{Area} &\approx 7 \cdot f(5) + 14 \cdot f(15) && = 49 + 112 \\ &= 7(7) + 14(8) && = \boxed{161} \end{aligned}$$

b) Use right-handed rectangles to approximate the area with 3 subintervals for f on the interval $[2, 19]$

$$\begin{aligned} A &\approx 5 \cdot f(7) + 5 \cdot f(12) + 7 \cdot f(19) && = 20 + 95 + 7 \\ &= 5(4) + 5(19) + 7(1) && = \boxed{122} \end{aligned}$$

c) Use left-handed rectangles to approximate the area with 4 subintervals for f on the interval $[7, 19]$

$$\begin{aligned} A &\approx 1 \cdot f(7) + 4 \cdot f(8) + 3 \cdot f(12) + 4 \cdot f(15) \\ &= 1(4) + 4(11) + 3(19) + 4(8) = \boxed{137} \end{aligned}$$

d) Use trapezoids to approximate the area with 3 subintervals for f on the interval $[5, 22]$

$$* \text{ Trapezoid Area} = \frac{w}{2} [h_1 + h_2]$$

$$\begin{aligned} A &\approx \frac{3}{2} [f(5) + f(8)] + \frac{7}{2} [f(8) + f(15)] + \frac{7}{2} [f(15) + f(22)] \\ &= \frac{3}{2} [7 + 11] + \frac{7}{2} [11 + 8] + \frac{7}{2} [8 + 5] \\ &= 27 + 66.5 + 45.5 = \boxed{139} \end{aligned}$$