Non-AP Calculus **<u>4-2, 4-6 Quiz Review Worksheet #2</u>**

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]

Non-AP Calculus **4-2, 4-6 Quiz Review Worksheet #2**

Key

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

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

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

$i=1 \quad i=2 \quad i=3 \quad i=?$

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

3) Use properties of summation to evaluate the sum:

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

$$\sum 2i^2 - \sum 4i + \sum 2$$

$$2\boxed{\sum i^2} - 4\boxed{\sum i} + 2\boxed{\sum 1}$$

$$2\left[\frac{n(n+1)(2n+1)}{6}\right]-4\left[\frac{n(n+1)}{2}\right]+2[n]$$

$$2\left[\frac{(31)(32)(63)}{6}\right]-4\left[\frac{31(32)}{2}\right]+2(31)$$

$$20832 - 1984 + 62 = \boxed{18910}$$

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*

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

$1 \quad \frac{5}{3} \quad 7/3 \quad 3 \quad 11/3 \quad \frac{13}{3} \quad 5$

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

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

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

a) Left endpoint (LRAM):

$$\text{Area} \approx \frac{4}{3}\cdot f(1)+\frac{4}{3}\cdot f\left(\frac{7}{3}\right)+\frac{4}{3}\cdot f\left(\frac{11}{3}\right)$$

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

$$=\boxed{\frac{752}{9}\approx 83.556}$$

b) Right Endpoint(RRAM):

$$\text{Area} \approx \frac{4}{3}\left[f(7/3)+f\left(\frac{11}{3}\right)+f(5)\right]$$

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

$$=\boxed{\frac{1616}{9}\approx 179.556}$$

c) Middle rectangle (MRAM):

$$\text{Area} \approx \frac{4}{3}\left[f\left(\frac{5}{3}\right)+f(3)+f\left(\frac{13}{3}\right)\right]$$

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

$$=\frac{1136}{9}\approx\boxed{126.222}$$

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

width → height ↗

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]

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

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

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

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

$$A \approx 1\cdot f(7) + 4\cdot f(8) + 3\cdot f(12) + 4\cdot f(15)$$

$$= 1(4) + 4(11) + 3(19) + 4(8) = \boxed{137}$$

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

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

$$A \approx \frac{3}{2}[f(5)+f(8)] + \frac{7}{2}[f(8)+f(15)] + \frac{7}{2}[f(15)+f(22)]$$

$$\frac{3}{2}[7+11] + \frac{7}{2}[11+8] + \frac{7}{2}[8+5]$$

$$27 + 66.5 + 45.5 = \boxed{139}$$