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

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

2) Use Sigma Notation to write the sum $\frac{4}{\sqrt[7]{8-3}} + \frac{16}{\sqrt[7]{8-9}} + \frac{64}{\sqrt[7]{8-27}} + \cdots \frac{1024}{\sqrt[7]{8-243}}$

3) Use properties of summation to evaluate the sum:

$$\sum_{i=1}^{27} 2(i-1)^2 + 3$$

4) Use Left, Middle, and Right endpoints to find approximations of area of region between the graph and the x-axis: $f(x) = 2 + 5x^2$ *in interval* $[4, 11]$ *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	2	4	7	9	16	17	21	23	27
f(x)	6	1	2	4	6	7	12	7	10

a) Use middle rectangles to approximate the area with 2 subintervals for *f* on the interval interval [2, 27]

x	1	3	7	9	16	17	21	23	27
f(x)	6	5	2	4	6	7	12	7	10

b) Use right-handed rectangles to approximate the area with 4 subintervals for *f* on the interval [7,21]

x	2	4	7	9	16	17	21	23	27
f(x)	6	1	2	4	6	7	12	7	10

c) Use left-handed rectangles to approximate the area with 3 subintervals for *f* on the interval [4,23]

x	2	4	7	9	16	17	21	23	30
f(x)	6	1	2	4	5	7	12	7	10

d) Use trapezoids to approximate the area with 3 subintervals for *f* on the interval [7, 30]

Key

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

1) *Find the Sum* $\sum_{k=3}^{5} \frac{1-k^2}{2k+1} = \frac{1-3^2}{2(3)+1} + \frac{1-4^2}{2(4)+1} + \frac{1-5^2}{2(5)+1}$

$= \frac{-8}{7} + \frac{-15}{9} + \frac{-24}{11} = \frac{-1153}{231} \approx \boxed{-4.991}$

2) Use Sigma Notation to write the sum $\frac{4}{\sqrt[7]{8-3}} + \frac{16}{\sqrt[7]{8-9}} + \frac{64}{\sqrt[7]{8-27}} + \cdots \frac{1024}{\sqrt[7]{8-243}}$

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

$$\boxed{\sum_{i=1}^{5} \frac{4^i}{\sqrt[7]{8-3^i}}}$$

3) Use properties of summation to evaluate the sum:

$\sum_{i=1}^{27} 2(i-1)^2 + 3 = 2(i-1)(i-1)+3 \to 2(i^2-2i+1)+3 \to 2i^2-4i+2+3$

$\sum 2i^2-4i+5$

$\sum 2i^2 - \sum 4i + \sum 5$

$2\boxed{\sum_{i=1}^{27} i^2} - 4\boxed{\sum_{i=1}^{27} i} + 5\boxed{\sum_{i=1}^{27} 1}$

$2\left[\frac{n(n+1)(2n+1)}{6}\right] - 4\left[\frac{n(n+1)}{2}\right] + 5[n]$

$2\left[\frac{27(28)(55)}{6}\right] - 4\left[\frac{27(28)}{2}\right] + 5[27]$

$= 13860 - 1512 + 135$

$= \boxed{12483}$

4) Use Left, Middle, and Right endpoints to find approximations of area of region between the graph and the x-axis: $f(x) = 2 + 5x^2$ *in interval* $[4, 11]$ *using* 3 *rectangles*

$w = \frac{b-a}{n} = \frac{11-4}{3} = \frac{7}{3}$

$4 \quad \frac{19}{3} \quad \frac{26}{3} \quad 11$

a) Left endpoint (LRAM):

$\text{Area} \approx \frac{7}{3}\left[f(4) + f\left(\frac{19}{3}\right) + f\left(\frac{26}{3}\right)\right]$

$= \frac{7}{3}[82 + 202.55 + 377.55]$

$= \boxed{1544.9}$

b) Right Endpoint(RRAM):

$\text{Area} = \frac{7}{3}\left[f(19/3) + f(26/3) + f(11)\right] = \boxed{2769.926}$

c) Middle rectangle (MRAM):

$4 \quad \frac{31}{6} \quad 19/3 \quad \frac{15}{2} \quad \frac{26}{3} \quad \frac{59}{6} \quad 11$

$A = \frac{7}{3}\left[f\left(\frac{31}{6}\right) + f\left(\frac{15}{2}\right) + f\left(\frac{59}{6}\right)\right]$

$= \boxed{2109.787}$

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

14 11

x	2	4	7	9	16	17	21	23	27
f(x)	6	1	2	4	6	7	12	7	10

Area = width × height

a) Use middle rectangles to approximate the area with 2 subintervals for *f* on the interval interval [2, 27]

$$A = 14 \cdot f(7) + 11 \cdot f(21)$$
$$= 14(2) + 11(12)$$

$$A = 28 + 132 = \boxed{160}$$

x	1	3	7	9	16	17	21	23	27
f(x)	6	5	2	4	6	7	12	7	10

b) Use right-handed rectangles to approximate the area with 4 subintervals for *f* on the interval [7,21]

$$A = 2 \cdot f(9) + 7 \cdot f(16) + 1 \cdot f(17) + 4 \cdot f(21)$$
$$= 2(4) + 7(6) + 1(7) + 4(12)$$

$$= \boxed{105}$$

x	2	4	7	9	16	17	21	23	27
f(x)	6	1	2	4	6	7	12	7	10

c) Use left-handed rectangles to approximate the area with 3 subintervals for *f* on the interval [4,23]

$$A = 5 \cdot f(4) + 8 \cdot f(9) + 6 \cdot f(17)$$
$$5(1) + 8(4) + 6(7)$$

$$= \boxed{79}$$

9 5 9

x	2	4	7	9	16	17	21	23	30
f(x)	6	1	2	4	5	7	12	7	10

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

d) Use trapezoids to approximate the area with 3 subintervals for *f* on the interval [7, 30]

$$A = \frac{9}{2}\left[f(7)+f(16)\right] + \frac{5}{2}\left[f(16)+f(21)\right] + \frac{9}{2}\left[f(21)+f(30)\right]$$
$$\frac{9}{2}[2+5] + \frac{5}{2}[5+12] + \frac{9}{2}[12+10]$$
$$31.5 + 42.5 + 99 = \boxed{173}$$