Sigma Notation Practice

Name: _____ Date: _____

Question 1

solve (use a graphing calculator)

I. $\sum_{k=1}^{2} \left(\frac{6k}{k+1}\right)$

II. $\sum_{k=1}^{4} (\cos k\pi)$

III. $\sum_{k=1}^{3} ((-1)^{k+1} \sin(\pi / k))$

Question 2

solve

$\sum_{k=1}^{n} a_k = 0$ $\sum_{k=1}^{n} b_k = 1$

I. $\sum_{k=1}^{n} 8a_k$

II. $\sum_{k=1}^{n} (a_k + 1)$

III. $\sum_{k=1}^{n} (b_k - 1)$

$\sum_{k=1}^{n} a_k = -5$ $\sum_{k=1}^{n} b_k = 6$

I. $\sum_{k=1}^{n} \frac{b_k}{6}$

II. $\sum_{k=1}^{n} (a_k + b_k)$

III. $\sum_{k=1}^{n} (a_k - b_k)$

IV. $\sum_{k=1}^{n} (b_k - 2a_k)$

Sigma Notation Practice

Question 3

solve

I. $\sum_{k=1}^{10} k$

II. $\sum_{k=1}^{10} k^2$

III. $\sum_{k=1}^{10} k^3$

Question 4

solve (use a graphing calculator)

I. $\sum_{k=1}^{7} (-2k)$

II. $\sum_{k=1}^{5} (k(3k+5))$

III. $\left(\sum_{k=1}^{7} k\right)^2 - \sum_{k=1}^{7} \left(\frac{k^3}{4}\right)$

IV. $\sum_{k=3}^{264} (10)$

V. $\sum_{k=18}^{71} (k(k-1))$

Question 5

solve

I. $\sum_{k=1}^{n} (4)$

II. $\sum_{k=1}^{n} c$

III. $\sum_{k=1}^{n} (k-1)$

Sigma Notation Practice

Question 6

solve

l. $f(x) = \sin x + 1$ $[-\pi, \pi]$ four subintervals of equal length

Question 7

determine the norm of partition

l. $\{-2, -1.6, -0.5, 0, 0.8, 1\}$

Sigma Notation Practice

Question 8

solve

l. $f(x) = 2x$ $[0, 3]$ n subintervals of equal length $n \longrightarrow \infty$

Sigma Notation Practice

Name: **Key** Date: _____

Question 1

solve (use a graphing calculator)

I. $\sum_{k=1}^{2} \left(\frac{6k}{k+1}\right) = 7$

II. $\sum_{k=1}^{4} (\cos k\pi) = 0$

III. $\sum_{k=1}^{3} ((-1)^{k+1} \sin(\pi / k)) = \frac{-2+\sqrt{3}}{2}$

Question 2

solve

$\sum_{k=1}^{n} a_k = 0 \qquad \sum_{k=1}^{n} b_k = 1$

I. $\sum_{k=1}^{n} 8a_k \longrightarrow 8\sum_{k=1}^{n} a_k \longrightarrow 8(0) = 0$ II. $\sum_{k=1}^{n} (a_k + 1) \longrightarrow \sum_{k=1}^{n} a_k + \sum_{k=1}^{n} 1 \longrightarrow 0 + n = n$

III. $\sum_{k=1}^{n} (b_k - 1) \longrightarrow \sum_{k=1}^{n} b_k - \sum_{k=1}^{n} 1 \longrightarrow 1 - n$

$\sum_{k=1}^{n} a_k = -5 \qquad \sum_{k=1}^{n} b_k = 6$

I. $\sum_{k=1}^{n} \frac{b_k}{6} \longrightarrow \frac{1}{6}\sum_{k=1}^{n} b_k \longrightarrow \frac{1}{6}(6) = 1$ II. $\sum_{k=1}^{n} (a_k + b_k) \longrightarrow \sum_{k=1}^{n} a_k + \sum_{k=1}^{n} b_k \longrightarrow -5 + 6 = 1$

III. $\sum_{k=1}^{n} (a_k - b_k) \longrightarrow \sum_{k=1}^{n} a_k - \sum_{k=1}^{n} b_k \longrightarrow -5 - 6 = -11$

IV. $\sum_{k=1}^{n} (b_k - 2a_k) \longrightarrow \sum_{k=1}^{n} b_k - 2\sum_{k=1}^{n} a_k \longrightarrow 6 - 2(-5) = 16$

Sigma Notation Practice

Question 3

solve

I. $\sum_{k=1}^{10} k \longrightarrow \frac{10(10+1)}{2} = 55$

II. $\sum_{k=1}^{10} k^2 \longrightarrow \frac{10(10+1)(2(10)+1)}{6} = 385$

III. $\sum_{k=1}^{10} k^3 \longrightarrow \left(\frac{10(10+1)}{2}\right)^2 = 3{,}025$

Question 4

solve (use a graphing calculator)

I. $\sum_{k=1}^{7} (-2k) = -56$

II. $\sum_{k=1}^{5} (k(3k+5)) = 240$

III. $\left(\sum_{k=1}^{7} k\right)^2 - \sum_{k=1}^{7} \left(\frac{k^3}{4}\right) = 588$

IV. $\sum_{k=3}^{264} (10) = 2{,}620$

V. $\sum_{k=18}^{71} (k(k-1)) = 117{,}648$

Question 5

solve

I. $\sum_{k=1}^{n} (4) \longrightarrow 4n$

II. $\sum_{k=1}^{n} c \longrightarrow cn$

III. $\sum_{k=1}^{n} (k-1) \longrightarrow \sum_{k=1}^{n} (k) - \sum_{k=1}^{n} (1) \longrightarrow \frac{n(n+1)}{2} - n \longrightarrow \frac{n^2-n}{2}$

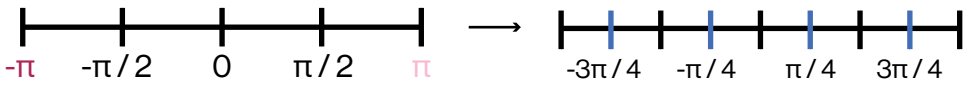
Sigma Notation Practice

Question 6

solve

l. $f(x) = \sin x + 1$ $[-\pi, \pi]$ four subintervals of equal length

Divide into Intervals $[-\pi, \pi]$:



Left Endpoints:

$f(-\pi) = \sin(-\pi) + 1 = 1$ $f(0) = \sin(0) + 1 = 1$

$f(-\pi / 2) = \sin(-\pi / 2) + 1 = 0$ $f(\pi / 2) = \sin(\pi / 2) + 1 = 2$

Right Endpoints:

$f(-\pi / 2) = \sin(-\pi / 2) + 1 = 0$ $f(\pi / 2) = \sin(\pi / 2) + 1 = 2$

$f(0) = \sin(0) + 1 = 1$ $f(\pi) = \sin(\pi) + 1 = 1$

Midpoints:

$f(-3\pi / 4) = \sin(-3\pi / 4) + 1 = \frac{2 - \sqrt{2}}{2}$ $f(3\pi / 4) = \sin(3\pi / 4) + 1 = \frac{2 + \sqrt{2}}{2}$

$f(-\pi / 4) = \sin(-\pi / 4) + 1 = \frac{2 - \sqrt{2}}{2}$ $f(\pi / 4) = \sin(\pi / 4) + 1 = \frac{2 + \sqrt{2}}{2}$

Question 7

determine the norm of partition

l. $\{-2, -1.6, -0.5, 0, 0.8, 1\}$

$|x_1 - x_0| = |-1.6 - -2| = 0.4$ $|x_2 - x_1| = |-0.5 - -1.6| = 1.1$ $|x_3 - x_2| = |0 - -0.5| = 0.5$ $|x_4 - x_3| = |0.8 - 0| = 0.8$

largest

$|x_5 - x_4| = |1 - 0.8| = 0.2$

$$\| P \| = 1.1$$

Sigma Notation Practice

Question 8

solve

I. $f(x) = 2x \qquad [0, 3] \qquad n$ subintervals of equal length $\qquad n \longrightarrow \infty$

$$\Delta x = \frac{3 - 0}{n} = \frac{3}{n} \longrightarrow c_i = i\Delta x = \frac{3i}{n}$$

right-hand sum :

$$\sum_{i=1}^{n} 2c_i \left(\frac{3}{n}\right) \rightarrow \sum_{i=1}^{n} \frac{6i}{n} \left(\frac{3}{n}\right) \rightarrow \frac{18}{n^2} \sum_{i=1}^{n} i \rightarrow \frac{18}{n^2} \left(\frac{n(n+1)}{2}\right) \rightarrow \frac{9n^2 + 9n}{n^2}$$

$$\lim_{n \longrightarrow \infty} \left(\frac{9n^2 + 9n}{n^2}\right) \rightarrow \left(9 + \frac{9}{n}\right) \rightarrow 9$$