Time fine   allowed 23m

$\bar{X} = 21.6 \quad m = 22$

First left @ 11
then 15, 16, 17, 19, 19
Bunch @ 19-20
med = 22
last at 28

MATH 131
Quiz V
October 29, 1993

Name Key

$$\sum_{k=1}^{n} k = \frac{n(n+1)}{2}, \quad \sum_{k=1}^{n} k^2 = \frac{n(n+1)(2n+1)}{6}, \quad \sum_{k=1}^{n} k^3 = \left(\frac{n(n+1)}{2}\right)^2$$

1. Find the left sum LR_4 and right sum RR_4 (with n = 4 subintervals) for approximating the area under the curve $f(x) = 3x^2 + 1$ for x between x = 1 and x = 3. You may use the calculator program or do by hand. 13

most

$$LR_4 = \frac{1}{2}\left(3(1)^2+1\right) + \frac{1}{2}\left(3\left(\tfrac{3}{2}\right)^2+1\right) + \frac{1}{2}\left(3(2^2)+1\right) + \frac{1}{2}\left(3\left(\tfrac{5}{2}\right)^2+1\right)$$

$$= \frac{1}{2}(4) + \frac{1}{2}\left(\frac{27}{4}+1\right) + \frac{1}{2}(13) + \frac{1}{2}\left(\frac{75}{4}+1\right)$$

$$= \frac{1}{2}\left(4 + \frac{31}{4} + 13 + \frac{79}{4}\right) = \boxed{22.25}$$

$$RR_4 = \frac{1}{2}\left(3\left(\tfrac{3}{2}\right)^2+1\right) + \cdots + \frac{1}{2}\left(3\left(\tfrac{5}{2}\right)^2+1\right) + \frac{1}{2}\left(3(3^2)+1\right) = 22.25 + \frac{28}{2} - 2$$

$\boxed{34.25}$

all but 3

2. Write out:

$$\sum_{k=2}^{4} (3k + k^3) = (6+8) + (9+27) + (12+64) =$$

$$14 + 36 + 76 = 126$$

3. Find the antiderivative of

a. $x^3 + 7x - 1$ $\quad \frac{x^4}{4} + \frac{7x^2}{2} - x + C$ 9

3 done

b. $\sin(4x)$ $\quad -\frac{\cos(4x)}{4} + C$

4. Solve for y: 14

$\frac{dy}{dx} = x^2 + 1$, y = 3 when x = 1

$$y = \frac{x^3}{3} + x + C \qquad y = \frac{x^3}{3} + x + \frac{5}{3}$$

$$3 = \frac{1}{3} + 1 + C$$

$$C = 2 - \frac{1}{3} = \frac{5}{3}$$

5. For $f(x) = 4x^3$ for between x = 0 and x = 2: 5

a. Find a formula for the right sum RR_n in terms of n.

b. Find the limit of RR_n as $n \to \infty$.

0, $\frac{2}{n}$, $\frac{4}{n}$ ... 2 = $n \cdot \frac{2}{n}$ $\qquad \Delta x = \frac{2}{n}$

$3x^3 + x \Big|_1^3$

$27 + 1 = 28$

$- 2$

28

a. $$\sum_{i=1}^{n} \frac{2}{n}\left(4\left(\frac{2i}{n}\right)^3\right)$$

b. $$\frac{8}{n^4} \sum_{i=1}^{n} (2i)^3 = \frac{64}{n^4} \sum_{i=1}^{n} i^3 = \frac{64}{n^4}\left[\frac{n(n+1)}{2}\right]^2$$

$$= 16 \frac{(n+1)}{n}\frac{(n+1)}{n} \to 16$$