

17
20

What day of the month is your birthday?
 What are the last 2 digits of your address?
 What are the last 2 digits of your zip code?

[5 POINTS] Use summation rules/shortcuts to compute the sum $\sum_{i=1}^{20} (2i - i^2)$. You must show the rules/shortcuts being used.

5

$$\sum_{i=1}^{20} 2i - \sum_{i=1}^{20} i^2$$

$$= 2 \sum_{i=1}^{20} i - \sum_{i=1}^{20} i^2$$

$$= 2 \left(\frac{20(21)}{2} \right) - \frac{20(21)(41)}{6}$$

$$= 420 - 2870$$

$$= -2450$$

$$\sum_{i=1}^n i = \frac{n(n+1)}{2}$$

$$\sum_{i=1}^n i^2 = \frac{n(n+1)(2n+1)}{6}$$

[5 POINTS] Compute the sum $\sum_{i=1}^n \frac{1}{n} \left[3 \left(\frac{i}{n} \right)^2 + \left(\frac{i}{n} \right) \right]$, and ALSO compute the limit of the sum as $n \rightarrow \infty$. Show your work.

4

$$= \sum_{i=1}^n \left[\frac{3i^2}{n^3} + \frac{i}{n^2} \right]$$

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

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

$$= \frac{3}{n^3} \cdot \frac{n(n+1)(2n+1)}{6} + \frac{1}{n^2} \cdot \frac{n(n+1)}{2}$$

$$= \frac{3n(n+1)(2n+1)}{6n^3} + \frac{n(n+1)}{2n^2}$$

$$= \frac{6n^2 + 9n + 3}{6n^2} + \frac{n+1}{2n}$$

$$= \lim_{n \rightarrow \infty} \left[\frac{6n^2 + 9n + 3}{6n^2} + \frac{n+1}{2n} \right] = 1 + \frac{1}{2}$$

$$= \frac{3}{2}$$

[8 POINTS]

Use summation rules/shortcuts to compute the sum $\sum_{i=1}^n f(x_i) \Delta x$ where

$$f(x) = 4x^2 - 2, \quad x = 2.1, 2.2, 2.3, \dots, 3.0, \quad \Delta x = 0.1, \quad n = 10.$$

You must show the rules/shortcuts being used. YOU WILL ONLY RECEIVE 1 POINT IF YOU SIMPLY LIST THE TERMS AND ADD THEM WITHOUT USING THE RULES/SHORTCUTS.

$$\begin{aligned} &= \sum_{i=1}^{10} [4(2+i)^2 - 2] (0.1) \\ &= \sum_{i=1}^{10} [0.4i^2 + 1.6i + 16 - 2] (0.1) \\ &= \sum_{i=1}^{10} [0.4i^2 + 1.6i + 14] (0.1) \\ &= 0.04 \sum_{i=1}^{10} i^2 + 0.16 \sum_{i=1}^{10} i + \sum_{i=1}^{10} 1.4 \\ &= 0.04 \left(\frac{10(11)(21)}{6} \right) + 0.16 \left(\frac{10(11)}{2} \right) + 1.4(10) \\ &= 1.54 + 8.8 + 14 = 24.34 \end{aligned}$$

[2 POINTS]

MULTIPLE CHOICE (NO PARTIAL CREDIT)

The table shows the velocity of an object at various times. Estimate the distance traveled using the method discussed in class.

Time (s)	0	0.5	1.0	1.5	2.0	2.5
Velocity (ft/s)	80	90	92	84	78	76

- [A] 187 feet
[D] 205 feet

- [B] 208 feet
[E] 193 feet

- [C] 184 feet
[F] 211 feet

LETTER OF
CORRECT ANSWER: B

[2 BONUS POINTS]

If $\sum_{i=c}^{50} (2i + 3) = 2220$, find the value of c .

YOU MAY USE ANY METHOD EXCEPT GUESS AND CHECK.