

What month is your birthday ?

What are the first 2 digits of your address ?

What are the last 2 digits of your zip code ?

What are the last 2 digits of your social security number ?

[IF YOU DO NOT HAVE A SOCIAL SECURITY NUMBER,
USE YOUR STUDENT ID NUMBER]Compute the sum, AND the limit of the sum as $n \rightarrow \infty$.

SCORE: ___ / 3 POINTS

$$\begin{aligned}
 & \sum_{i=1}^n \frac{1}{n} \left[6 \left(\frac{i}{n} \right) - 3 \left(\frac{i}{n} \right)^2 \right] \\
 &= \sum_{i=1}^n \left(\frac{6}{n^2} i - \frac{3}{n^3} i^2 \right) \\
 &= \frac{6}{n^2} \sum_{i=1}^n i - \frac{3}{n^3} \sum_{i=1}^n i^2 \\
 &= \frac{6}{n^2} \frac{1}{2} n(n+1) - \frac{3}{n^3} \frac{1}{6} n(n+1)(2n+1) \\
 &= \frac{3(n+1)}{n} - \frac{(n+1)(2n+1)}{2n^2}
 \end{aligned}$$

$$\begin{aligned}
 & \lim_{n \rightarrow \infty} \left(\frac{3(n+1)}{n} - \frac{(n+1)(2n+1)}{2n^2} \right) \\
 &= \lim_{n \rightarrow \infty} \left(\frac{3n+3}{n} - \frac{2n^2+3n+1}{2n^2} \right) \\
 &= 3 - 1 = 2
 \end{aligned}$$

Compute the sum of the form $\sum_{i=1}^n f(x_i) \Delta x$ if

SCORE: ___ / 6 POINTS

$$f(x) = 4x^2 + 3, \quad x = 2.1, 2.2, 2.3, \dots, 3.0, \quad \Delta x = 0.1, \quad n = 10$$

Use the rules and shortcuts of summation, and show your work. **DO NOT SIMPLY ADD A LIST OF NUMBERS.**

$$\begin{aligned}
 & \sum_{i=1}^{10} f(2.1 + 0.1(i-1)) 0.1 \\
 &= \sum_{i=1}^{10} f(2 + 0.1i) 0.1 \\
 &= 0.1 \sum_{i=1}^{10} (4(2 + 0.1i)^2 + 3) \\
 &= 0.1 \sum_{i=1}^{10} (16 + 1.6i + 0.04i^2 + 3) \\
 &= 0.1 \sum_{i=1}^{10} (19 + 1.6i + 0.04i^2) \\
 &= 0.1 \left(\sum_{i=1}^{10} 19 + 1.6 \sum_{i=1}^{10} i + 0.04 \sum_{i=1}^{10} i^2 \right) \\
 &= 0.1 \left(10 \times 19 + 1.6 \times \frac{1}{2} (10 \times 11) + 0.04 \times \frac{1}{6} (10 \times 11 \times 21) \right) \\
 &= 29.34
 \end{aligned}$$

[MULTIPLE CHOICE] Given that $\sum_{i=1}^n i^3 = \frac{n^2(n+1)^2}{4}$, find the value of $\sum_{i=1}^{20} (2 + 3i - i^3)$.

SCORE: ___ / 1 POINT

[a] -43680

[b] -43620

[c] -43430

[d] -43470

LETTER OF CORRECT ANSWER: [C]