

MATH 102
QUIZ # 2

NAME: SEC. #:

ID #:

Q1. Simplify the given expression

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

Q2. Find the derivative $\frac{d}{dx} \left[\int_1^x \sin \sqrt{t} dt \right]$

$$\begin{aligned} &= \frac{d}{dx} \left(\int_1^x \sin \sqrt{t} dt \right) \\ &= \sin \sqrt{x} \end{aligned}$$

Q3. Evaluate

$$\begin{aligned} \int_1^4 \frac{2x-3}{\sqrt{x}} dx &= \\ &= \int_1^4 x^{-\frac{1}{2}} (2x-3) dx \\ &= \int_1^4 (2x^{\frac{1}{2}} - 3x^{-\frac{1}{2}}) dx \\ &= \left(\frac{4}{3} x^{\frac{3}{2}} - 6x^{\frac{1}{2}} \right) \Big|_1^4 \\ &= \frac{10}{3} \end{aligned}$$