

Question 1 [10 points]: Use the definition of the definite integral in the form

$$\int_a^b f(x) dx = \lim_{n \rightarrow \infty} \sum_{i=1}^n f(x_i) \Delta x$$

to evaluate

$$\int_0^2 (x^2 - x) dx$$

Question 2:

(a)[3] Determine the average value of $f(x) = \frac{\ln x}{x}$ over the interval $[1, e]$.

(b)[3] Evaluate $\int_1^2 \frac{2}{3-5x} dx$.

(c)[4] Evaluate $\int \sec^2 x \cos(\tan x) dx$.

Question 3 [10 points]: Evaluate

$$\int (x^2 + 1) \cos(2x) dx$$

Question 4 [10 points]: Evaluate

$$\int_0^{\pi/3} \tan^5 x \sec^4 x \, dx$$

Question 5: Determine

$$\int \frac{1}{x\sqrt{5-x^2}} dx$$