

Show all work and circle/box your final answer. All answers must be simplified unless stated otherwise.

1. Approximate the area under the graph of $f(x) = x^2$ and above the x -axis from $x = 1$ to $x = 5$ using the following methods with $n = 4$. (a) Use left endpoints. (b) Use right endpoints. (c) Average the answers in parts a and b. (d) Use midpoints.
2. Suppose that f and h are integrable and that

$$\int_1^9 f(x) dx = -1, \int_7^9 f(x) dx = 5, \int_7^9 h(x) dx = 4$$

Find

- (a) $\int_9^7 [h(x) - f(x)] dx$
 - (b) $\int_7^9 [2f(x) - 3h(x)] dx$
 - (c) $\int_1^7 f(x) dx$
3. Evaluate the following integrals:
 - (a) $\int_1^2 \frac{4t^2 + 2t^3 + 8}{4t^2} dt$
 - (b) $\int_{-2}^2 (x^3 - 2x + 3) dx$
 - (c) $\int_{1/2}^{3/2} (-2x + 4) dx$ (Check your answer using area)
 4. Find $\frac{d}{dx} \int_1^{\sin x} 3t^2 dt$ by
 - (a) By evaluating the integral and differentiating the result
 - (b) By differentiating the integral directly (i.e. using FTC part 1).