

Problem 1. Calculate $\int_1^2 x^2 dx$ by definition using right endpoint approximation. (Given: $\sum_{i=1}^n i = \frac{1}{2}n(n+1)$, $\sum_{i=1}^n i^2 = \frac{1}{6}n(n+1)(2n+1)$)

Problem 2. Calculate definite integrals.

(1) $\int_0^\pi (\sin x + \cos x) dx$

(2) $\int_{-1}^1 (x^2 - 2e^x) dx$

(3) $\int_1^3 \sqrt{1 - (x-2)^2} dx$

(4) $\int_{-1}^1 x \cos^3 x dx$

Problem 3. Find the total area bounded by $y = \sin x$ and the x -axis on $[-\pi/4, \pi/2]$.

Problem 4. A car is traveling on a road. Its velocity at time t is $v(t) = t^2 - t$. (units: mile, hour)

(1) Find the total displacement of the car in the first two hours.

(2) If the car consumes 0.1 gallons of gas per mile, how much gas does it consume in the first two hours?