1. Use the midpoint rule with $n = 3$ to estimate the value of $\int_{-2}^{4} \frac{x}{1+x^2} \, dx$.

2. Evaluate the definite integral $\int_{-1}^{1} x(4 + 3x) \, dx$. 
3. Evaluate the definite integral \( \int_{-3}^{3} x^3 \, dx \).

4. Evaluate the definite integral \( \int_{0}^{1} \sin(\pi x) \, dx \).

5. Which is greater, \( \int_{-1}^{1} x^2 \, dx \) or \( \int_{-1}^{1} |x| \, dx \)?
6. Find the average value of the function $f(x) = \frac{1}{3}x^4$ over the interval $[0, 8]$.

7. The velocity of an object is $v(t) = 2t - 6$. Find the total distance traveled over $0 \leq t \leq 4$.

8. Find the general indefinite integral $\int \frac{1}{\sqrt{x}} + \sec^2 x \, dx$. 
9. Find the general indefinite integral $\int -2 \sin(\theta) \cos^3(\theta) \, d\theta$.

10. Find the derivative of the function $g(x) = \int_x^0 \frac{\sin t}{t} \, dt$.

11. Find the derivative of the function $g(x) = \int_0^{x^2} \frac{1}{1+t} \, dt$. 