

1. Approximate $\int_0^{\frac{\pi}{2}} \cos^2 x \, dx$ using 3 approximating rectangles and right endpoints.
2. Evaluate the integral $\int \frac{x^2 + 2}{x} \, dx$.
3. Evaluate the integral $\int \frac{e^x}{\sqrt{1 + e^x}} \, dx$.
4. Evaluate the integral $\int_{-2}^2 2 - |x| \, dx$.
5. Find the area under the curve $y = x \sin(x^2)$ over the interval $[0, \sqrt{\pi}]$.
6. A particle moves with velocity $v(t) = 12 - 4t \frac{\text{m}}{\text{s}}$. Determine the **total distance** traveled over the interval $[0, 5]$.
7. Determine the average value of the function $f(x) = \frac{\ln x}{x}$ over the interval $[1, e]$.
8. Find the derivative of the function $F(x) = \int_{2x}^{\pi} \frac{\cos \theta}{\theta} \, d\theta$.
9. Let $g(x) = e^{(e^x)}$.
 - a) Find the derivative $g'(x)$.
 - b) Solve the equation $g(x) = 2$ for x .
10. Use logarithmic differentiation to find y' when $y = \frac{e^x(x^2 - 1)^3}{\sqrt{3x + 2}}$.
11. Find $(f^{-1})'(2)$ for $f(x) = 1 + e^x$.
12. Let $f(x) = \sqrt{x - 1}$.
 - a) Find a formula for $f^{-1}(x)$.
 - b) What are the domain and range of $f^{-1}(x)$?