1. Approximate \( \int_{-2}^{0} \frac{1}{1 + x^2} \, dx \) using 4 approximating rectangles and right endpoints. Your answer should be a sum of numbers; there is no need to compute the sum.

2. According to the midpoint rule, which of the following expressions should be the best approximation for \( \int_{0}^{\pi} \cos^2 x \, dx \)?
   a) \( \sum_{i=1}^{6} \frac{\pi}{6} \cos^2 \left[ \frac{(i - 1)\pi}{6} \right] \)
   b) \( \sum_{i=1}^{6} \frac{\pi}{6} \cos^2 \left[ \frac{i\pi}{6} \right] \)
   c) \( \sum_{i=1}^{6} \frac{\pi}{6} \cos^2 \left[ \frac{(2i - 1)\pi}{12} \right] \)

3. Evaluate the integral \( \int_{-2}^{2} \frac{|x|}{x} \, dx \).

4. Evaluate the indefinite integral \( \int \frac{\sin (\ln x)}{x} \, dx \).

5. Evaluate the integral \( \int_{0}^{\ln 4} e^{-x} \, dx \). Simplify your answer.

6. A particle has velocity at time \( t \) given by \( v(t) = \cos(t) \).
   a) Find the displacement of the particle from time \( t = 0 \) to time \( t = \frac{3\pi}{4} \).
   b) Find the total distance traveled by the particle from time \( t = 0 \) to time \( t = \frac{3\pi}{4} \).

7. A function \( f \) is given by the formula \( f(x) = \int_{x}^{2x} \ln t \, dt \). Calculate \( f'(x) \).

8. A function \( f \) is given by the formula \( f(x) = \int_{0}^{\ln 13} e^{t^2} \, dt \). Calculate \( f'(x) \).

9. A particle moves with velocity \( v(t) = 6 - 3t^2 m \). Determine the average velocity of the particle over the interval \([0, 2]\).

10. Find \( y' \) when \( y = \left( \frac{2x + 1}{\sqrt{3x + 2}} \right)^5 \).

11. Calculate \( (f^{-1})'(1) \) if \( f(x) = \frac{2x}{x+1} \).

12. Find \( y' \) if \( y = \frac{1}{\ln x} \).