

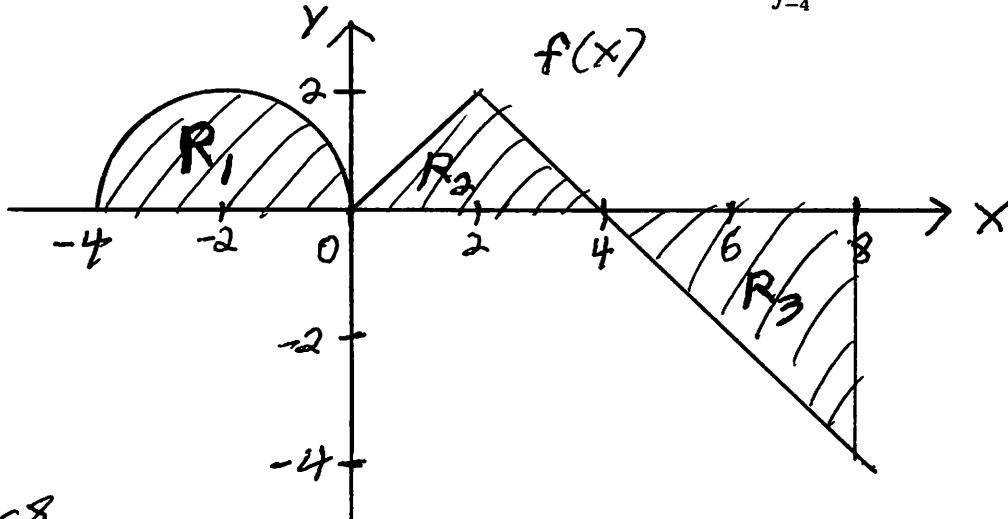
Name SOLUTIONS

• You have 15 minutes

• No calculators

• Show sufficient work

1. (3 points) The graph of $f(x)$ is shown below. Evaluate $\int_{-4}^8 f(x) dx$.



$$\begin{aligned}
 \int_{-4}^8 f(x) dx &= \text{area}(R_1) + \text{area}(R_2) - \text{area}(R_3) \\
 &= \frac{1}{2} \pi (2)^2 + \frac{1}{2} (4)(2) - \frac{1}{2} (4)(4) \\
 &= 2\pi + 4 - 8 \\
 &= \boxed{2\pi - 4}
 \end{aligned}$$

2. (3 points) Evaluate the following definite integral. Simplify your answer.

$$\begin{aligned}
 \int_1^9 \frac{1}{2x} dx &= \frac{1}{2} \int_1^9 \frac{1}{x} dx \\
 &= \frac{1}{2} [\ln|x|]_1^9 \\
 &= \frac{1}{2} [\ln(9) - \ln(1)] \\
 &= \frac{1}{2} [\ln(9) - 0] \\
 &= \frac{1}{2} \ln(9) \\
 &= \frac{1}{2} \ln(3^2) = \frac{1}{2} \cdot 2 \ln(3) = \boxed{\ln(3)}
 \end{aligned}$$

3. (4 points) Evaluate the following indefinite integrals.

$$\begin{aligned} \text{(a)} \int \frac{x^4 + 16}{x^2} dx &= \int \left(\frac{x^4}{x^2} + \frac{16}{x^2} \right) dx \\ &= \int (x^2 + 16x^{-2}) dx \\ &= \frac{1}{3} x^3 - 16x^{-1} + C \end{aligned}$$

$$\begin{aligned} \text{(b)} \int 12 \csc(2x) \tan x dx &= \int \frac{12}{\sin(2x)} \cdot \frac{\sin x}{\cos x} dx \\ &= \int \frac{12}{2 \sin x \cos x} \cdot \frac{\sin x}{\cos x} dx \\ &= \int \frac{6}{\cos^2 x} dx \\ &= \int 6 \sec^2 x dx \\ &= 6 \tan x + C \end{aligned}$$