Problem 1: (5 points) Estimate the area under the graph of \( f(x) = 4 - x^2 \) from \( x = -2 \) to \( x = 2 \) using four approximating rectangles and taking the sample point to be the left endpoint.

Problem 2: (8 points)

(a) Evaluate the limit
\[
\lim_{n \to \infty} \sum_{i=1}^{n} \left[ \left( \frac{i}{n} \right)^2 + 2 \right] \left( \frac{4}{n} \right)
\]

(b) Write the limit as a definite integral on the interval \([0,1]\) and evaluate it.
Problem 3: (8 points) Evaluate the integrals

(a) \( \int \frac{dx}{1 + e^{-x}} \)

(b) \( \int \frac{x^3 + \ln x}{x} \, dx \)

Problem 4: (4 points) If \( f(x) = \int_{x^2}^{1} \frac{t \ln t}{t^2 + 1} \, dt \) find \( f'(e) \).
Problem 1: (5 points) Estimate the area under the graph of \( f(x) = 4 - x^2 \) from \( x = -2 \) to \( x = 2 \) using four approximating rectangles and taking the sample point to be the right endpoint.

Problem 2: (8 points)

(c) Evaluate the limit
\[
\lim_{n \to \infty} \sum_{i=1}^{n} \left[ \left( \frac{i}{n} \right)^2 + 1 \right] \left( \frac{4}{n} \right)
\]

(d) Write the limit as a definite integral on the interval \([0,1]\) and evaluate it.
Problem 3: (8 points) Evaluate the integrals

(c) \[ \int \frac{dx}{e^x + e^{-x}} \]

(d) \[ \int \frac{x + \ln x}{x \ln x} \, dx \]

Problem 4: (4 points) If \( f(x) = \int_{x^2}^{1} \frac{t \sin t}{t^2 + 1} \, dt \) find \( f'(0) \).