Practice Exam

January 21, 2009

1 Estimate the area under the graph \( f(x) = \cos x \) from 0 to \( \frac{\pi}{2} \) using four approximating rectangles and midpoints. Sketch the graph and the rectangles.

2 Express the following limit as a definite integral in the interval [2,6]:

\[
\lim_{n \to \infty} \sum_{i=1}^{n} x_i \ln(1 + x_i^2) \Delta x
\]

3 Evaluate the following integral:

\[
\int_{0}^{10} |x - 5| \, dx
\]

4 Find the derivative of the following function:

\[
g(x) = \int_{\tan x}^{x^2} \frac{1}{\sqrt{2 + t^4}} \, dt
\]

5 If \( F(x) = \int_{1}^{x} f(t) \, dt \), where \( f(t) = \int_{t^2}^{u^4} \frac{u}{u} \, du \), find \( F''(2) \).

6 If \( f(1) = 12 \), \( f' \) is continuous and \( \int_{1}^{4} f'(x) \, dx = 17 \), what is the value of \( f(4) \).

7 Evaluate the following integral:

\[
\int \frac{e^x}{e^x + 1} \, dx
\]

8 Evaluate the following integral:

\[
\int_{-\pi}^{\pi} \sin^5 x \, dx
\]

9 Evaluate the following integral:

\[
\int_{0}^{10} 3x^2 + x - 10 \, dx
\]

10 Who is the best superhero? (Circle the answer or write in another one)

Spider-Man, Superman, Batman, Captain America, Daredevil

Green Lantern, Wolverine, Buffy, Angel, Tim Gunn

Ozymandias, Rorschach, Mr. Fantastic, El Santo, Other