

MATH 105 101 Midterm 2 Sample 3

1. (20 marks)

(a) (5 marks) Find the derivative $\frac{dF}{dx}$ of the function:

$$F(x) = \int_{\cos(x)}^x \sin(t) dt.$$

(b) (5 marks) Use the Trapezoidal Rule to approximate

$$\int_0^6 (x-2)^2 dx$$

with $n = 3$ equal subintervals. **Simplify your answer.**

(c) (5 marks) Evaluate the indefinite integral:

$$\int \cos^5(x) dx.$$

(d) (5 marks) Compute the Midpoint Riemann sum for the function $f(x) = x^2$ on the interval $[-5, 5]$ using $n = 5$ equal subintervals. **Simplify your answer.**

2. (10 marks) Evaluate the following indefinite integral:

$$\int \frac{\sqrt{x^2 - 2x - 8}}{x - 1} dx.$$

3. (10 marks) Find the solution of the initial value problem:

$$\frac{dy}{dt} e^{-y} - \frac{\ln(t)}{t} = 0, \quad y(1) = 0.$$

You may leave the answer in its implicit form.

4. (10 marks) Evaluate the definite integral:

$$\int_0^8 \frac{x^3 - 6x^2 - 2x - 11}{x^2 - 6x - 7} dx.$$