

Math 181 sample problems for Hour Exam Two

Evaluate the following integrals, write clearly, and show your steps and method.

1.

$$\int \frac{1}{x^2 - 3} dx,$$

$$\int \frac{1}{x^2 + 3} dx$$

$$\int \frac{1}{x^2 + 5x + 4} dx$$

$$\int \frac{1}{x^2 + 4x + 5} dx$$

$$\int \frac{x}{x^2 + 5x + 4} dx$$

$$\int \frac{x}{x^2 + 4x + 5} dx$$

$$\int x \sin x dx$$

$$\int \ln x dx$$

$$\int x \ln x dx$$

$$\int x^2 e^{-x} dx$$

$$\int x e^{-x^2} dx$$

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

2. Use the trapezoid rule and the midpoint rule with one interval ($n=1$) to estimate

$$\int \frac{1}{1+x^2} dx$$

3. Evaluate the improper integrals:

(a) $\int_0^\infty (1+x)^{3/2} dx$.

(b) $\int_0^\infty x^2 e^{-x} dx$.

4. Calculate the length of the curve $y = x^{3/2}$ from $x = 0$ to $x = 5$.

5. Calculate the area of the surface obtained by rotating the curve $y = x^3$ from $x = 0$ to $x = 4$ about the x -axis.

6. A fish tank is filled to a height of 1 foot with water which weighs 62.5 pounds per cubic foot. One side is a vertical rectangular sheet of glass with 2 square feet below the water level. What is the force of the water on this side? (Set up and evaluate an integral.)