MAT 126 Calculus B Spring 2006
Practice Midterm I

Name:_____

I.D.:_____   **Section number:**_____

Answer each question in the space provided and on the reverse side of the sheets. Show your work whenever possible. Unless otherwise indicated, **answers without justification will get little or no partial credit!** Cross out anything that grader should ignore and circle or box the final answer.

1. (a) (10 points) Estimate the area under the graph of $f(x) = 16 - x^2$ from $x = 0$ to $x = 4$ using four rectangles and right endpoints. Sketch the graph and rectangles. Is your estimate and underestimate or an overestimate?

    (b) (10 points) Repeat part (a) using left endpoints.

2. (a) (10 points) Evaluate integral by interpreting it as area

$$\int_{-5}^{5} \sqrt{25 - x^2}\,dx$$

    (b) (5 points) Determine a region whose area is equal to

$$\lim_{n \to \infty} \sum_{i=1}^{n} \frac{\pi}{4n} \tan \frac{i\pi}{4n}$$

    Do not evaluate the limit.

3. Given two functions $f(x)$ and $g(x)$ which satisfy

$$\int_0^3 f(x)\,dx = 5, \quad \int_0^5 f(x)\,dx = 7,$$

$$\int_3^5 g(x)\,dx = 1, \quad \int_0^5 g(x)\,dx = 9,$$

find

(a) (5 points)

$$\int_3^5 (3f(x) - g(x))\,dx$$

(b) (5 points)

$$\int_0^3 (f(x) + 2g(x))\,dx$$

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4. (5 points) Express the limit as a definite integral on the given interval $[0, 4]$:

$$\lim_{n \to \infty} \sum_{i=1}^{n} \frac{e^{x_i}}{1 + x_i} \Delta x$$

5. Evaluate the following indefinite integrals

    (a) (5 points)

$$\int (3 \cos x - 4 \sin x) dx$$

    (b) (10 points)

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

6. Evaluate the following definite integrals

    (a) (5 points)

$$\int_{1}^{2} x^{-2} dx$$

    (b)

$$\int_{1}^{8} \frac{x - 1}{\sqrt[3]{x^2}} dx$$

    (c) (5 points)

$$\int_{1}^{27} \frac{1}{9t} dt$$

    (d) (5 points)

$$\int_{\ln 3}^{\ln 6} 5e^x dx$$

    (e) (10 points)

$$\int_{\pi/3}^{\pi/2} \csc x \cot x \, dx$$