MA 126 (Calculus-II) Midterm test #1
Show your work. Each problem is 10 points Fri, Sep 23, 2005

1. State Fundamental Theorem of Calculus (both parts).

2. Find the derivative $f'(x)$ of the function

$$f(x) = \int_{\ln x}^{x^2} \sqrt{1+t^3}\, dt$$

3. Evaluate the indefinite integral $\int \ln(x^5)\, dx$.

4. Evaluate the indefinite integral $\int e^{-2x} \sin x\, dx$.

5. Evaluate the indefinite integral

$$\int \frac{4}{x^2 - 4x}\, dx.$$

6. Evaluate the definite integral $\int_0^{\pi/2} \cos^4 x\, dx$.

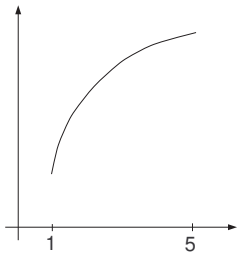
7. Determine whether the improper integral

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

converges or diverges. If it converges, compute its value.

8. Find the area enclosed by the curves $y = x$, $y = 1/x$, and $y = 2$.

9. Let $I = \int_1^5 f(x)\, dx$, where $f(x)$ is the function whose graph is shown below. For any value of n, list the numbers L_n, R_n, M_n, T_n, and I in increasing order.



10. Evaluate the definite integral $\int_{-1}^{1} xe^{-x^4}\,dx$ (the answer is simple, but you need to explain it).

[Bonus] Evaluate the integral

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