MAC 2312 Calculus 2 **Test 1** 20 Sep 2001

Show **ALL** work for credit, correct answers are worthless without showing the process used to get them; be neat; and use only **ONE** side of each page of paper. Do **NOT** write on this page. Calculators can be used for graphing and calculating only. Give exact answers when possible.

1. Show all work needed to evaluate

$$\int 10^{1-x} dx$$

.

2. Show all work needed to evaluate

$$\int_1^4 \frac{\cos\sqrt{y}}{\sqrt{y}}\, dy$$

3. Show all work needed to evaluate

$$\int \frac{(t+2)^2}{t^3}\, dt$$

4. Show all work needed to compute the value of both the integrals below assuming $k > 0$.

$$\int_0^8 w^{-1/3}\, dw$$

$$\int_0^\infty e^{-kw}\, dw$$

5. Use the comparison test to show that both the given integrals converge.

$$\int_5^\infty \frac{1}{\theta^4 + 1}\, d\theta$$

$$\int_5^\infty \frac{1}{\theta^4 - 1}\, d\theta$$

6. Time and time again.
   a. Suppose a certain computer takes two seconds to compute a certain definite integral accurate to 4 digits to the right of the decimal point, using the left rectangle rule. How long (in years) will it take to get 12 digits correct using the left rectangle rule?
   b. Repeat part (a) but this time assume that the trapezoidal rule is being used throughout. Answer in "reasonable" units of time.

7. Show all work needed to evaluate

(1pt) $\int \frac{1}{\sqrt{x}} dx$

(3pt) $\int \frac{1}{\sqrt{\sqrt{x}+1}} dx$

(6pt) $\int \frac{1}{\sqrt{x}+1} dx$

There is more test on the otherside

Welcome to side two

8. A limited amount of Maple, and a Mapleless limit.

A. Write a correct maple expression for the following.

$$(3x^{-1} - \pi)(yz + \frac{1}{2a})^{w+5}$$

B. Find the limit, justifying any use of L'Hopital's rule.

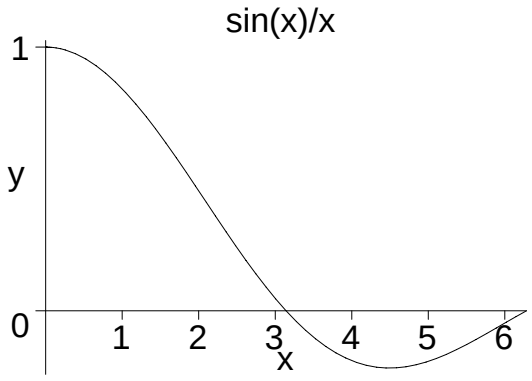
$$lim_{x\to\infty}\frac{\ln x}{x^2}$$

9. The graph of the function $f(x) = \sin x/x$ is given below. Consider

$$\int_{0.5}^{1} f(x)\ dx$$

A. Arrange the approximations $LEFT(n), RIGHT(n), MID(n), TRAP(n)$ and the "true value" of the integral in incresing order.

B. Use your trusty TI-89 to compute $TRAP(100)$ for this integral, report all the digits it gives.




10. Suppose for a certain definite integral that $TRAP(10) = 4.6893$ and $TRAP(50) = 4.6966$. Estimate the actual error for $TRAP(10)$ and the actual vaule of the integral by assuming that the error is reduced by a factor of roughly 25 in going from $TRAP(10)$ to $TRAP(50)$.