Problem Set 1   Calculus 2   Due 9/3/2004

You are encouraged to work in groups of two to four on this assignment and make a single group submission. Each problem is worth 5 points. For full credit indicate clearly how you reached your answer. All work must be legible and submitted on clean paper without ragged edges.

1. Maple is stumped by the integral $\int (1 + \ln x)\sqrt{1 - (x \ln x)^2}\, dx$ (try it!). Make a u-substitution so that Maple can handle the resulting integral, and use that to find the value of the original integral.

2. Have Maple evaluate the following integrals:

a) $\displaystyle \int \frac{1}{(x+2)(x+5)}\, dx$

b) $\displaystyle \int \frac{1}{(x+3)(x+1)}\, dx$

c) $\displaystyle \int \frac{1}{(x+2)(x-3)}\, dx$

d) What's the general pattern?

3. a) Find the area of the ellipse $4x^2 + y^2 = 16$.

b) Find the area of a general ellipse $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} = 1$.

4. a) Evaluate $\displaystyle \int_0^P \sin q\, dq$.

b) Evaluate $\displaystyle \int_0^P \sin^2 q\, dq$.

c) Evaluate $\displaystyle \int_0^P \sin^3 q\, dq$.

d) Evaluate $\displaystyle \int_0^P \sin^4 q\, dq$.

e) Find a general pattern for $\displaystyle \int_0^P \sin^n q\, dq$.