

Problem Set 1 Calculus 2 Due 1/23/04

You are encouraged to work in groups of two to four on this assignment and make a single group submission. Each problem is worth 3 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. Find the first 30 digits of π (count carefully!).

2. In the next chapter we'll find that the x coordinate of the center of mass of the first-quadrant

portion of a unit circle with uniform density centered at the origin is given by $\frac{\int_0^1 x\sqrt{1-x^2} dx}{\int_0^1 \sqrt{1-x^2} dx}$.

Find a decimal approximation of this value to two decimal places, and explain whether you find your result plausible or not.

3. Find a formula for $\int_0^1 x^n dx$ in terms of the value of n for any natural number n . [You're encouraged to conjecture something based on evidence from the computer, but for full credit you need to provide some justification based on calculus.]

4. Find a formula for $\int_0^\pi \sin^n \theta d\theta$ in terms of the value of n for any natural number n . [A guess is enough this time!]

5. Find a formula for $\int \frac{(\ln x)^n}{x} dx$ in terms of the value of n for any natural number n . [You're encouraged to conjecture something based on evidence from the computer, but for full credit you need to provide some justification based on calculus.]