# CALCULUS II – EXAM 2 – FALL 2000
# NO CALCULATORS

**NAME** _____
**Rec. Instr.** _____
**Rec. Time.** _____

**1.(26pts) Integrate:**

**a.** $\int \frac{x-1}{x^2+x+1}dx =$

**b.** $\int_0^\pi sin^3(y)dy =$

**2.(26pts) Integrate:**

**a.** $\int \frac{dx}{2x^2 + 5x + 3} =$

**b.** $\int_0^\infty x^2 e^{-3x} dx =$

**3. Consider the function**

$$f(x) = Cx \ln \frac{1}{x}$$

**on the interval $[0, 1]$ ($C$ is a positive constant).**
**a. (5pts) Find the limit of $f$ as $x$ tends to 0, and as $x$ tends to 1.**

**b.(5pts) Is $f(x)$ positive on $[0, 1]$? Circle one: YES, NO.**
**c.(10pts) Find the value of $C$ for which $\int_0^1 f(x)dx = 1$.**

**d.(10pts) Take $C$ to be the value you found in c. and compute the mean of $f$ on $[0, 1]$.**

**4. (25pts) At time $t = 0$, one thousand of the $40,000$ people living in Manhattan have caught the flu. Assume that the number of people $F(t)$ who have caught the flu at time $t$ increases following the logistic equation**

$$\frac{dF}{dt} = 10^{-4}F(40,000 - F)$$

**Solve this equation for $F$ and find how long it will take until $10,000$ people have caught the flu.**