CALCULUS II – EXAM 3 – Spring 2001
NO CALCULATORS

NAME ______________________
Rec. Instr. ______________________
Rec. Time. ______________________

1. (26pts).
a. (13pts) Integrate $\int x^2 e^{-2x} dx$

b. (13pts) Is $\int_2^\infty \frac{1}{x(\ln x)^2} dx$ **finite or infinite? Compute.**

2.(28pts) A cyclist is pedaling, from right to left, at a constant speed of 50 cm/sec. A light is attached to a spoke of the front wheel, 25 cm from the center. At time $t = 0$, the center of the front wheel is at $(0, 0)$ and the light is at $(0, 25)$. The wheels have a radius of 50 cm. Suppose that after 4 seconds the inclination of the ground changes from horizontal to 30 degrees up. Write equations for the motion of the light $(X_L(t), Y_L(t))$, for $t \geq 0$. (You will have to break this motion up into two pieces.)

3.(28pts) A particle $P(t) = (x(t), y(t))$ satisfies the following equations:

$$\begin{aligned} x(t) &= -1 + 3\cos(3\pi t) \\ y(t) &= 5 - 3\sin(3\pi t) \end{aligned}$$

What is the distance traveled by P when t goes from 0 to 1?

4. (28pts) One dose of the drug Smartox yields an initial concentration of 0.01% of poly-exter-cerebro-slycene in your blood-stream. Knowing that this concentration decays exponentially with a half-life of 2 hours and 30 minutes, at what intervals of time should you be taking the drug if you want the stable concentration to be 0.02%?