CALCULUS II – EXAM 1 – FALL 2000
NO CALCULATORS

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

1.(16pts) Differentiate the following functions:

a. $f(x) = x \ln x$

b. $g(t) = e^{3 \ln t}$

(16pts) Integrate:

a. $\int_2^3 \frac{dx}{x \ln x} =$

c. $\int_0^1 \frac{1}{e^{-2t}} dt =$

2. (30pts) Let $f(x) = \pi x e^{-(0.5)10^{-2}\pi x}$, for $x > 0$.

a. (6pts) Find the following limits:

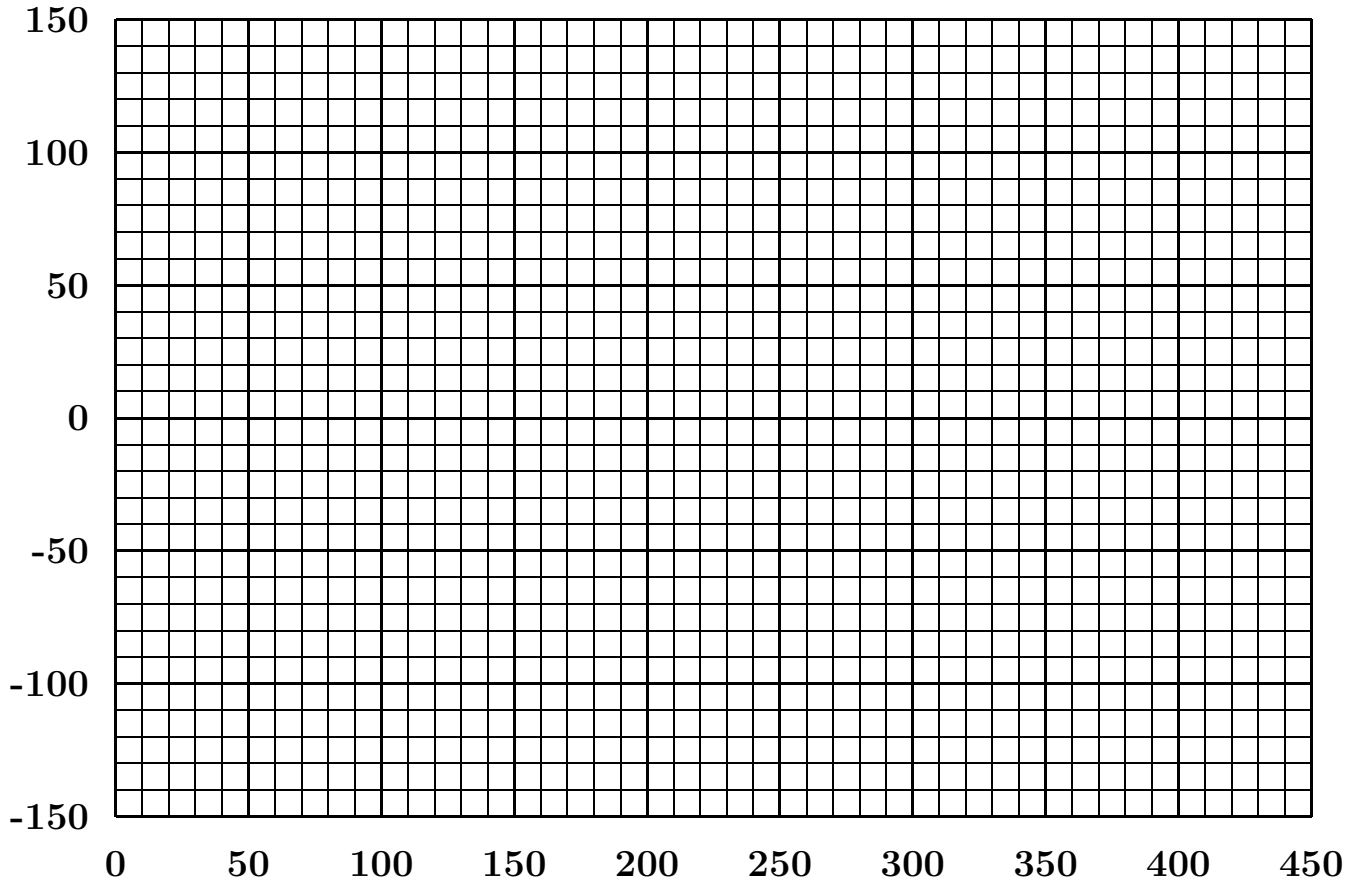
$\lim_{x \to 0^+} f(x) =$

$\lim_{x \to +\infty} f(x) =$

b. (8pts) $f'(x) = 0$ has one solution. Find it.

c. (8pts) $f''(x) = 0$ has one solution. Find it

d. (8pts) Graph $y = f(x)$, labeling the extremum and the inflection point. (Hint: to evaluate $f(x)$ at the critical point and at the inflection point use the following approximate values:
$e^{-1} = .36$, $e^{-2} = .13$, $1/\pi = .32$)



3. (20pts) On a 90° summer day a swimming pool is filled with 55° water. After 2 hours the temperature of the water is 60°. In how many hours will the water reach a comfortable swimming temperature of 70°? (Assume the outside temperature remains 90°.) Use $\ln 4 = 1.38$ and $\ln 7 = 1.94$.

4. (20pts) A tank originally contains 100 gal of fresh water. Water with 0.5 lb/gal of salt is poured into the tank at a rate of 2 gal/min, and the well-stirred mixture is allowed to leave at the same rate. After 10 minutes the process is stopped, and fresh water is poured into the tank at a rate of 2 gal/min, with the mixture again leaving at the same rate. Find the amount of salt in the tank at the end of 20 minutes. Use $e^{-0.2} = 0.8$.