Math 1001 Name:
Quiz 4 GSA:

50 min. No books, no notes, no electronic devices. You must show your work to receive credit.

1.[18] For the function $f(x) = xe^{-x}$

(a) Find the critical points of f.

(b) Find $f''(x)$.

(c) Find the open intervals on which f is concave up and the open intervals on which f is concave down.

(d) Identify any inflection points for the graph of f. Give the actual points.

(e) Use the second derivative test to identify any local extrema for the graph of f.

2.[5] Use l'Hôpital's rule to compute $\lim_{x\to 1} \dfrac{\ln x}{\sin(x-1)}$. Indicate which case of *l'H* you're using.

3.[6] A rectangular field is to be bounded by a fence on three sides and a straight stream on the fourth side. Find the dimensions of the field with maximum area that can be enclosed using 800 ft. of fence.

4.[7] Find the general antiderivative (indefinite integral): $\int \left(2\sin x - \frac{1}{1+x^2} + e^{3x}\right) dx$

5.[5] Let f be integrable on $[1,3]$. If $\int_1^3 f(x)\,dx = -8$ and $\int_1^2 f(x)\,dx = 1$, what's $\int_2^3 f(x)\,dx$?

6.[6] Use the Fundamental Theorem of Calculus to find the *average value* of $f(x) = x^2 - 1$ on $[-1,1]$.

7.[13] Use the Fundamental Theorem of Calculus to evaluate the following definite integrals. Simplify your final answers.

(a) $\displaystyle\int_1^4 \left(\frac{1}{x} + \sqrt{x}\right) dx.$

(b) $\displaystyle\int_0^{\ln 2} e^{-x}\,dx.$