Name: _____ _____ **/ 25**

There are 25 points possible on this quiz. No aids (book, calculator, etc.) are permitted. **Show all work for full credit.**

1. [10 points] On a given day, the flow rate F, measured in cars per hour, on a congested roadway is given by $F(v) = \dfrac{5v}{v^2+100}$ where v is the speed of the traffic in miles per hour.

a. Given the context of the problem, what is a reasonable domain?

b. Find all critical numbers of the $F(v)$ in your domain in part (a).

c. **Use Calculus** to determine if the critical number(s) correspond to an absolute minimum or absolute maximum or neither. Note providing organized clear work here is crucial.

d. Write a complete sentence explaining what your work in part (c) indicates about traffic flow.

2. [8 points] Evaluate the following limits. Show your work.

a. $\lim_{x\to 0} \dfrac{2(e^x - x - 1)}{3x^2}$

b. $\lim_{x\to 0^+} x^x$

3. [7 points] Evaluate the following indefinite integrals. Show your work.

a. $\int (x^{2/3} + x^{-1/3})dx$

b. $\int (\sec^2(x) - \dfrac{x^2+1}{x^2})dx$