Limit/Derivative Gateway #3 **Math 232**

- *You can take as long as you like to complete this gateway.*
- *To pass this gateway you must get 4 of the 5 problems COMPLETELY correct.*
- *If your previous gateway was number k, please make sure this is gateway $k+1$.*
- *If the first gateway you pass is number n then your score for gateways will be $20-n$.*
- ***Circle your final answers; that is what I will grade.***
- ***No calculators, books, or notes allowed!!***

1. Find the following limits:

(**a**) $\lim_{x\to\infty} (\ln(\frac{1}{x}))^2$

(**b**) $\lim_{x\to 0} \dfrac{\sin 3x}{5x}$

2. Find the derivatives of the following functions (don't simplify your answers):

(**a**) $f(x) = xe^{\sin x}$

(**b**) $f(x) = \sec(x^5)$

(**c**) $f(x) = \sin^{-1}(\cot^2(x^3))$