Limit/Derivative Gateway #0 **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**) $\lim_{x\to\infty} \dfrac{e^{-4x}-6}{3+(\frac{1}{2})^x}$

(**b**) $\lim_{x\to 1} \dfrac{\sin(\ln x)}{x-1}$

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

(**a**) $f(x) = \dfrac{\sqrt[3]{x}}{x^5-3x^2+7}$

(**b**) $f(x) = x^4 \log_3(2^x)$

(**c**) $f(x) = \sin^3(\tan^{-1}(5x))$