

- 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) $\lim_{x \rightarrow \infty} \frac{e^{0.25x} - 5}{4 + 2^{-x}}$

(b) $\lim_{x \rightarrow \frac{\pi}{2}} \frac{\sin(\cos x)}{\cos x}$

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

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

(b) $f(x) = 3^x \ln(x^2 + 1)$

(c) $f(x) = \sec(\sin^{-1}(3x))$