Math 181 Honors Quiz 8 Version A

1. Find the following derivatives

(i) $\dfrac{d}{dx}\left(\sin^2 x + \sin x^2\right)$

(ii) $\dfrac{d}{dx}\dfrac{1}{1+|x|}$

(iii) $\dfrac{d}{dx}\left(2+x^2\right)^x$

(iv) $\dfrac{d}{dx}\sqrt{\log(8+x)}$

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You may wish to use

> **Lemma 4.1.** Suppose f is defined on (a, b) and reaches its maximum or minimum at c. If $f'(c)$ exists, then $f'(x) = 0$.

when working this part of the quiz.

2. Do one of the following:

   (i) Suppose that a function f is continuous on the closed interval $[a, b]$ and differentiable on the open interval (a, b). Prove there exists a number c in the interval (a, b) where $f'(c) = (f(b) - f(a))/(b - a)$.

   (ii) Show that if f is differentiable at a, then f is continuous at a.