Math 181 Quiz 7 Version A

1. Precisely define $\lim\limits_{x \to \infty} f(x) = L$ using inequalities in terms of M and ϵ.

2. Use the limit definition and the facts that

$$\lim_{\theta \to 0} \frac{\sin \theta}{\theta} = 1 \qquad \text{and} \qquad \lim_{\theta \to 0} \frac{1 - \cos \theta}{\theta} = 0$$

to explain why the derivative of $f(x) = \sin x$ is $f'(x) = \cos x$.

3. Use the rules of calculus to find the following derivatives:

(i) $\dfrac{d}{dx} \arctan(x^2)$

(ii) $\dfrac{d}{dx} \dfrac{\sin x}{x}$