Math 181 Honors Quiz 5 Version A

1. Find the following derivatives:

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

(ii) $\dfrac{d}{dx}\big(12 \arctan(-x)\big)$

(iii) $\dfrac{d}{dx}\Big(\dfrac{\sqrt{x}}{1+x^4}\Big)$

(iv) $\dfrac{d}{dx} \sin\Big(\dfrac{2}{x} + \dfrac{1-2x}{x^2}\Big)$

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2. Use the definintion of derivative

$$f'(x) = \lim_{x \to h} \frac{f(x+h) - f(x)}{h}$$

and the limit laws to compute $f'(x)$ when $f(x) = x^2$.

3. Show that

$$\frac{d \arctan x}{dx} = \frac{1}{1+x^2}$$

using the identity $(\sec x)^2 = 1 + (\tan x)^2$ and the fact that $\dfrac{d \tan x}{dx} = (\sec x)^2$.