

Math 181 Honors Quiz 9 Version A

1. Find the following derivatives:

(i) $\frac{d}{dx}(x^2 + x^{-2})$

(ii) $\frac{d}{dx}(x^{\sqrt{2}} \sin x)$

(iii) $\frac{d}{dx}\left(\frac{1}{1+|x|}\right)^x$

(iv) $\frac{d}{dx} \arcsin\left(\frac{2 \arctan x}{\pi}\right)$

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2. State the Taylor formula for e^x with $a = 0$.

3. Let $f(x) = \sin x - x \cos x$.

(i) Find the unique $c \in (0, 2\pi)$ such that $f'(c) = 0$.

(ii) Show that $f(x)$ is increasing on $(0, c)$ and decreasing on $(c, 2\pi)$.

(iii) Show that $(\sin x) - \pi \leq x \cos x$ for all $x \in [0, 2\pi]$.