MATH 1600 **Quiz 11 (Solutions)** NOV 1, 2018
SUBHADIP CHOWDHURY

Full Name: _____

1. Find the derivative of the following functions. You may need to use chain rule and/or product rule.

(a) $\tan\left(4^{x-1}\right)$ [7]

Solution: The chain is as follows:

$$x \to \underbrace{x-1}_{u} \to \underbrace{4^{x-1}}_{v} \to \underbrace{\tan(4^{x-1})}_{w}$$

Then

$$\frac{dw}{dx} = \frac{dw}{dv}\cdot\frac{dv}{du}\cdot\frac{du}{dx} = \sec^2 v \cdot 4^u \ln 4 \cdot 1 = \sec^2(4^{x-1})4^{x-1}\ln 4$$

(b) $e^{(x\sin x)}$ [8]

Solution: The chain is as follows:

$$x \to \underbrace{x\sin x}_{u} \to \underbrace{e^{x\sin x}}_{v}$$

Chain rule says,

$$\frac{dv}{dx} = \frac{dv}{du}\cdot\frac{du}{dx}$$

Now, $\frac{dv}{du} = e^u$. And $\frac{du}{dx} = x\cos x + \sin x$ by product rule.
Hence, $\frac{dv}{dx} = e^{x\sin x}(x\cos x + \sin x)$