

1 Question: find the slope of function $\sin(x)^{\cos(x)}$ in point $\frac{\pi}{2}$.

As we know the derivative of a function tells us what is the slope of this function in any point. The easiest way to solve this task is to calculate the derivative of $\sin(x)^{\cos(x)}$ and see what is the value of this derivative in point $\frac{\pi}{2}$

$$f(x) = \sin(x)^{\cos(x)} = e^{\ln(\sin(x)^{\cos(x)})} = e^{\cos(x) \cdot \ln(\sin(x))} \quad (1)$$

$$f'(x) = e^{\cos(x) \cdot \ln(\sin(x))} \cdot \frac{d}{dx}(\cos(x) \cdot \ln(\sin(x))) \quad (2)$$

$$f'(x) = e^{\cos(x) \cdot \ln(\sin(x))} \cdot \left(-\sin(x) \cdot \ln(\sin(x)) + \frac{\cos^2(x)}{\sin(x)} \right) \quad (3)$$

Looks scary but we need to just set $\frac{\pi}{2}$ as an x

$$f'\left(\frac{\pi}{2}\right) = e^{\cos(\frac{\pi}{2}) \cdot \ln(\sin(\frac{\pi}{2}))} \cdot \left(\sin(\frac{\pi}{2}) \cdot \ln(\sin(\frac{\pi}{2})) + \frac{-\cos^2(\frac{\pi}{2})}{\sin(\frac{\pi}{2})} \right) \quad (4)$$

$$f'\left(\frac{\pi}{2}\right) = e^0 \cdot (0 + 0) = 0 \quad (5)$$