① $y = \ln(\cos^2 x)$

$y = 2\ln(\cos x)$ ← power property

$$y' = 2\left(\dfrac{-\sin x}{\cos x}\right)$$

$$y' = -2\tan x$$

$(\ln u)' = \dfrac{u'}{u}$

$u = \cos x$

$u' = -\sin x$

② $f(x) = (2x)^{2x}$

$\ln y = \ln(2x)^{2x}$ ← power prop

$\ln y = 2x \cdot \ln(2x)$ ← product rule

$u'v + uv'$

$u = 2x$, $v = \ln(2x)$

$u' = 2$, $v' = \dfrac{2}{2x}$

$$\dfrac{y'}{y} = 2(\ln 2x) + 2x\left(\dfrac{2}{2x}\right)$$

$$y \cdot \dfrac{y'}{y} = 2\ln 2x + 2 \cdot (2x)^{2x}$$ ← mult. both sides by y

$$y' = 2(\ln 2x + 2x^{2x})$$ ← my attempt at simplifying "