1. Use logarithmic differentiation to find the derivative of the function $y = \sqrt{e^x \sin(x) \cos(x)}$.

1. Use logarithmic differentiation to find the derivative of the function $y = x^2 e^x \sin(x) \cos(x)$.

1. Use logarithmic differentiation to find the derivative of the function $y = \dfrac{1}{e^x \sin(x) \cos(x)}$.

1. Use logarithmic differentiation to find the derivative of the function $y = xe^x \sin^2(x)$.