45) $F(x) = x \cdot 9^x$ $xe^{\ln 9 \cdot x}$

$F'(x) = 1 \cdot 9^x + x[\ln 9 \cdot 9^x]$

$= 9^x(1 + x\ln 9)$

47) $g(t) = t^2 \cdot 2^t$

$g'(t) = 2t \cdot 2^t + t^2 \cdot (\ln 2 \cdot 2^t)$

$= t2^t(2 + \ln 2 \cdot t)$

$t^2 \cdot 2^t$

$t^2 e^{\ln 2 \cdot t}$

$2t \cdot e^{\ln 2 t} + t^2 \cdot e^{\ln 2 t} \cdot \ln 2$

$2t \cdot 2^t + t^2 \ln 2 \cdot 2^t$

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43) $y = 5^{-4x} = e^{\ln 5(-4x)}$

$\dfrac{dy}{dx} = e^{\ln 5(-4x)} \cdot -4\ln 5$

$= 5^{-4x}(-4\ln 5)$

$\rule{4cm}{0.4pt}$

$y = 5^{-4x}$

$\ln 5 \cdot 5^{-4x}(-4)$

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45) $F(x) = x \cdot 9^x$

$F(x) = x \, e^{\ln 9 \cdot x}$

$F'(x) = 1 e^{\ln 9 x} + x \cdot \ln 9 \, e^{\ln 9 x}$

$= 9^x + x\ln 9 \cdot 9^x$

$= 9^x(1 + x\ln 9)$

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49) $h(\theta) = 2^{-\theta} \cos(\pi\theta)$

$h(\theta) = e^{-\ln 2 \cdot \theta} \cdot \cos(\pi\theta)$

$h'(\theta) = -\ln 2 \cdot 2^{-\theta} \cos(\pi\theta) - 2^{-\theta}\pi \sin \pi\theta$

$= 2^{-\theta}\left(-\ln 2 \cdot \cos(\pi\theta) - \pi\sin(\pi\theta)\right)$

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57) $F(x) = \log_2\left(\dfrac{x^2}{x-1}\right)$

$F(x) = \dfrac{\ln\left(\dfrac{x^2}{x-1}\right)}{\ln 2}$

$F(x) = \dfrac{\ln x^2 - \ln(x-1)}{\ln 2}$

$F'(x) = \dfrac{1}{\ln 2}\left[\dfrac{2}{x} - \dfrac{1}{x-1}\right]$

$\dfrac{2(x-1) - x}{\ln 2 \cdot x \cdot (x-1)} = \dfrac{x-2}{x\ln 2(x-1)}$

$\log_2 x = y$

$2^y = x$

$\ln 2^y = \ln x$

$y = \dfrac{\ln x}{\ln 2}$