5. $f(x) = (3x)^{3x}$

[A] $y = (3x)^{3x}$

$\ln y = 3x \ln 3x$

$\frac{1}{y} \frac{dy}{dx} = 3x \cdot \frac{1}{3x} \cdot 3 + \ln 3x \, (3)$

$\frac{1}{y} \frac{dy}{dx} = 3 + 3\ln 3x$

$\frac{dy}{dx} = 3(3x)^{3x} (1 + \ln 3x)$

6. $y = (\sin x)^{e^x}$

$\ln y = e^x \ln \sin x$

[D] $\frac{1}{y} \frac{dy}{dx} = e^x \cdot \frac{1}{\sin x} \cdot \cos x + (\ln \sin x) e^x$

$\frac{dy}{dx} = y \left(e^x \cot x + e^x \ln(\sin x) \right)$

$= e^x (\sin x)^{e^x} \left(\cot x + \ln(\sin x) \right)$

7. $y = 5x^2 + 4x \qquad x = \ln t$

$y = 5(\ln t)^2 + 4(\ln t)$

[C] $\frac{dy}{dt} = 10(\ln t) \cdot \frac{1}{t} + 4 \cdot \frac{1}{t}$

$= \frac{10}{t} \ln t + \frac{4}{t}$

8. $f(x) = 5^{3x}$

$f'(x) = 5^{3x} \ln 5 \cdot 3$

[A] $= 5^{3x} \ln 5^3$

$= 5^{3x} \ln 125$