11.) $Y = \ln 3x \xrightarrow{D} Y' = \frac{1}{3x} \cdot 3 = \frac{1}{x}$

16.) $Y = \ln\left(\frac{10}{x}\right) = \ln 10 - \ln x \xrightarrow{D}$
$Y' = \frac{-1}{x}$

19.) $Y = \ln x^3 = 3 \cdot \ln x \xrightarrow{D}$
$Y' = 3 \cdot \frac{1}{x}$

20.) $Y = (\ln x)^3 \xrightarrow{D} Y' = 3(\ln x)^2 \cdot \frac{1}{x}$

22.) $Y = t (\ln t)^{1/2} \xrightarrow{D}$
$Y' = t \cdot \frac{1}{2}(\ln t)^{-1/2} \cdot \left(\frac{1}{t}\right) + (1) \cdot (\ln t)^{1/2}$

25.) $Y = \frac{\ln t}{t} \xrightarrow{D} Y' = \frac{t \cdot \left(\frac{1}{t}\right) - \ln t \cdot (1)}{t^2}$

28.) $Y = \frac{x \ln x}{1 + \ln x} \xrightarrow{D}$
$Y' = \frac{(1 + \ln x) \cdot \left(x \cdot \frac{1}{x} + (1)\ln x\right) - x \ln x \cdot \left(\frac{1}{x}\right)}{(1 + \ln x)^2}$

30.) $Y = \ln(\ln(\ln x)) \xrightarrow{D}$
$Y' = \frac{1}{\ln(\ln x)} \cdot \frac{1}{\ln x} \cdot \frac{1}{x}$

32.) $Y = \ln(\sec\theta + \tan\theta) \xrightarrow{D}$
$Y' = \frac{1}{\sec\theta + \tan\theta} \cdot (\sec\theta\tan\theta + \sec^2\theta)$

37.) $Y = \ln(\sec(\ln\theta)) \xrightarrow{D}$

$$Y' = \frac{1}{\sec(\ln\theta)} \cdot \sec(\ln\theta)\tan(\ln\theta) \cdot \frac{1}{\theta}$$

39.) $Y = \ln \frac{(x^2+1)^5}{(1-x)^{1/2}} = \ln(x^2+1)^5 - \ln(1-x)^{1/2}$

$\qquad = 5\ln(x^2+1) - \frac{1}{2}\ln(1-x) \xrightarrow{D}$

$\qquad Y' = 5 \cdot \frac{1}{x^2+1} \cdot 2x - \frac{1}{2} \cdot \frac{1}{1-x} \cdot (-1)$

40.) $Y = \ln\left(\frac{(x+1)^5}{(x+2)^{20}}\right)^{1/2} = \ln \frac{(x+1)^{5/2}}{(x+2)^{10}}$

$\qquad = \ln(x+1)^{5/2} - \ln(x+2)^{10} = \frac{5}{2}\ln(x+1) - 10\ln(x+2) \xrightarrow{D}$

$\qquad Y' = \frac{5}{2} \cdot \frac{1}{x+1} - 10 \cdot \frac{1}{x+2}$

51.) $Y = \frac{x(x^2+1)^{1/2}}{(x+1)^{2/3}} \longrightarrow \ln Y = \ln \frac{x \cdot (x^2+1)^{1/2}}{(x+1)^{2/3}}$

$\qquad \longrightarrow \ln Y = \ln x + \frac{1}{2}\ln(x^2+1) - \frac{2}{3}\ln(x+1) \xrightarrow{D}$

$\qquad \frac{1}{Y}Y' = \frac{1}{x} + \frac{1}{2} \cdot \frac{2x}{x^2+1} - \frac{2}{3} \cdot \frac{1}{x+1} \longrightarrow$

$\qquad Y' = \frac{x(x^2+1)^{1/2}}{(x+1)^{2/3}} \cdot \left[\frac{1}{x} + \frac{x}{x^2+1} - \frac{2}{3} \cdot \frac{1}{x+1}\right]$

54.) $Y = \left(\frac{x(x+1)(x-2)}{(x^2+1)(2x+3)}\right)^{1/3} \longrightarrow$

$\qquad \ln Y = \ln\left(\frac{x^{1/3} \cdot (x+1)^{1/3} \cdot (x-2)^{1/3}}{(x^2+1)^{1/3}(2x+3)^{1/3}}\right) \longrightarrow$

$\qquad \ln Y = \frac{1}{3}\ln x + \frac{1}{3}\ln(x+1) + \frac{1}{3}\ln(x-2)$

$\qquad\qquad - \frac{1}{3}\ln(x^2+1) - \frac{1}{3}\ln(2x+3) \xrightarrow{D}$

$$\frac{1}{Y}Y' = \frac{1}{3}\cdot\frac{1}{x} + \frac{1}{3}\cdot\frac{1}{x+1} + \frac{1}{3}\cdot\frac{1}{x-2}$$

$$- \frac{1}{3}\cdot\frac{2x}{x^2+1} - \frac{1}{3}\cdot\frac{2}{2x+3} \longrightarrow$$

$$Y' = \left(\frac{x(x+1)(x-2)}{(x^2+1)(2x+3)}\right)^{1/3}\left[\frac{1}{3x} + \frac{1}{3(x+1)} + \frac{1}{3(x-2)}\right.$$

$$\left. - \frac{2x}{3(x^2+1)} - \frac{2}{3(2x+3)}\right]$$

59.) $Y = \ln\left(\frac{e^\theta}{1+e^\theta}\right) = \ln e^\theta - \ln(1+e^\theta)$

$$= \theta - \ln(1+e^\theta) \xrightarrow{D}$$

$$Y' = 1 - \frac{1}{1+e^\theta}\cdot e^\theta$$

61.) $Y = e^{(\cos t + \ln t)} \xrightarrow{D}$

$$Y' = e^{(\cos t + \ln t)}\cdot\left(-\sin t + \frac{1}{t}\right)$$

65.) $x^Y = Y^x \longrightarrow \ln x^Y = \ln Y^x \longrightarrow$

$Y\cdot\ln x = x\cdot\ln Y \xrightarrow{D}$

$Y\cdot\frac{1}{x} + Y'\cdot\ln x = x\cdot\frac{1}{Y}Y' + (1)\cdot\ln Y \longrightarrow$

$Y'\ln x - \frac{x}{Y}Y' = \ln Y - \frac{Y}{x} \longrightarrow$

$Y'\left(\ln x - \frac{x}{Y}\right) = \ln Y - \frac{Y}{x} \longrightarrow$

$$Y' = \frac{\ln Y - Y/x}{\ln x - x/Y}$$

66.) $\tan Y = e^X + \ln x \xrightarrow{D}$

$\sec^2 Y \cdot Y' = e^X + \frac{1}{x} \longrightarrow$

$$Y' = \frac{e^X + \frac{1}{x}}{\sec^2 Y}$$

68.) $Y = 3^{-X} \xrightarrow{D} Y' = 3^{-X} \cdot (-1) \cdot \ln 3$

71.) $Y = X^{\pi} \xrightarrow{D} Y' = \pi X^{\pi - 1}$

74.) $Y = \log_3 (1 + \theta \ln 3) \xrightarrow{D}$

$$Y' = \frac{1}{1 + \theta \ln 3} \cdot \ln 3 \cdot \frac{1}{\ln 3} = \frac{1}{1 + \theta \ln 3}$$

82.) $Y = \log_7 \left(\dfrac{\sin \theta \cdot \cos \theta}{e^{\theta} \cdot 2^{\theta}} \right)$

$= \log_7 (\sin \theta) + \log_7 (\cos \theta) - \log_7 e^{\theta} - \log_7 2^{\theta}$

$= \log_7 (\sin \theta) + \log_7 (\cos \theta) - \theta \cdot \log_7 e - \theta \log_7 2$

$\xrightarrow{D} Y' = \frac{1}{\sin \theta} \cdot \cos \theta \cdot \frac{1}{\ln 7} + \frac{1}{\cos \theta} \cdot -\sin \theta \cdot \frac{1}{\ln 7}$

$\quad - \log_7 e - \log_7 2$

85.) $Y = 3^{\log_2 t} \xrightarrow{D} Y' = 3^{\log_2 t} \cdot \ln 3 \cdot \frac{1}{2} \cdot \frac{1}{\ln 2}$

86.) $Y = 3 \log_8 (\log_2 t) \xrightarrow{D}$

$$Y' = 3 \cdot \frac{1}{\log_2 t} \cdot \frac{1}{\ln 8} \cdot \frac{1}{t} \cdot \frac{1}{\ln 2}$$

90.) $y = x^{x+1} \longrightarrow \ln Y = \ln x^{x+1} = (x+1) \ln x \xrightarrow{D}$

$$\frac{1}{Y} \cdot Y' = (x+1) \cdot \frac{1}{x} + (1) \cdot \ln x \longrightarrow$$

$$Y' = x^{x+1} \left(\frac{x+1}{x} + \ln x \right)$$

92.) $Y = t^{\sqrt{t}} \longrightarrow \ln Y = \ln t^{\sqrt{t}} = \sqrt{t} \cdot \ln t \xrightarrow{D}$

$$\frac{1}{Y} Y' = \sqrt{t} \cdot \frac{1}{t} + \frac{1}{2} t^{-\frac{1}{2}} \cdot \ln t \longrightarrow$$

$$Y' = t^{\sqrt{t}} \left(\frac{1}{\sqrt{t}} + \frac{1}{2} t^{-\frac{1}{2}} \cdot \ln t \right)$$

93.) $Y = (\sin x)^x \longrightarrow \ln Y = \ln (\sin x)^x \longrightarrow$

$$\ln Y = x \cdot \ln (\sin x) \xrightarrow{D}$$

$$\frac{1}{Y} Y' = x \cdot \frac{1}{\sin x} \cdot \cos x + (1) \cdot \ln (\sin x) \longrightarrow$$

$$Y' = (\sin x)^x \cdot [x \cot x + \ln (\sin x)]$$

96.) $Y = (\ln x)^{\ln x} \longrightarrow \ln Y = \ln (\ln x)^{\ln x} \longrightarrow$

$$\ln Y = \ln x \cdot \ln (\ln x) \xrightarrow{D}$$

$$\frac{1}{Y} Y' = \ln x \cdot \frac{1}{\ln x} \cdot \frac{1}{x} + \frac{1}{x} \cdot \ln (\ln x) \longrightarrow$$

$$Y' = (\ln x)^{\ln x} \cdot \left[\frac{1}{x} + \frac{\ln (\ln x)}{x} \right]$$