7.3

(#56) $y = 2^{10^x} \Rightarrow \log_2 y = 10^x \Rightarrow \log_{10}(\log_2 y) = x$

Interchange x and y $\Rightarrow$ $y = \log_{10}(\log_2 x)$ is the inverse function

7.4

(#4) $f(x) = \ln(\sin^2 x)$

Chain Rule $f'(x) = \frac{1}{\sin^2 x} \cdot 2\sin x \cdot \cos x = 2\cot x$

(#22) $y = [\ln(1+e^x)]^2$

Chain Rule $y' = 2[\ln(1+e^x)] \cdot \frac{1}{1+e^x} \cdot e^x$

$$= \frac{2e^x \ln(1+e^x)}{1+e^x}$$

(#46) $y = x^{\cos x}$

$\ln y = \cos x \ln x$

$\frac{1}{y} y' = -\sin x \ln x + \frac{\cos x}{x}$

$\Rightarrow y' = x^{\cos x}\left(-\sin x \ln x + \frac{\cos x}{x}\right)$

(#74) Let $u = \ln x$ Then $du = \left(\frac{1}{x}\right)dx$

So $\int \frac{\sin(\ln x)}{x}\, dx = \int \sin u \, du$

$= -\cos u + C$

$= -\cos(\ln x) + C$