39. $\frac{d}{dx}\ln(2-\cos x)=\frac{1}{u}\frac{du}{dx}$

$\frac{d}{dx}\ln(u)$ $\quad u=2-\cos x$

$\frac{du}{dx}=\sin x$

$f'(x)=\frac{\sin x}{2-\cos x}$

Domain of x is all real numbers.

Section 3.9 Exercises

1. $\frac{dy}{dx}=\frac{d}{dx}(2e^x)=2e^x$

3. $\frac{dy}{dx}=\frac{d}{dx}e^{-x}=e^{-x}\frac{d}{dx}(-x)=-e^{-x}$

5. $\frac{dy}{dx}=\frac{d}{dx}e^{2x/3}=e^{2x/3}\frac{d}{dx}\left(\frac{2x}{3}\right)=\frac{2}{3}e^{2x/3}$

7. $\frac{dy}{dx}=\frac{d}{dx}(xe^2)-\frac{d}{dx}(e^x)=e^2-e^x$

11. $\frac{dy}{dx}=\frac{d}{dx}8^x=8^x\ln 8$

13. $\frac{dy}{dx}=\frac{d}{dx}3^{\csc x}=3^{\csc x}(\ln 3)\frac{d}{dx}(\csc x)$

$=3^{\csc x}(\ln 3)(-\csc x\cot x)$

$=-3^{\csc x}(\ln 3)(\csc x\cot x)$

15. $\frac{dy}{dx}=\frac{d}{dx}\ln(x^2)=\frac{1}{x^2}\frac{d}{dx}(x^2)=\frac{1}{x^2}(2x)=\frac{2}{x}$

17. $\frac{dy}{dx}=\frac{d}{dx}\ln(x^{-1})=\frac{d}{dx}(-\ln x)=-\frac{1}{x},\ x>0$

19. $\frac{d}{dx}\ln(\ln x)=\frac{1}{\ln x}\frac{d}{dx}\ln x=\frac{1}{\ln x}\cdot\frac{1}{x}=\frac{1}{x\ln x}$

21. $\frac{dy}{dx}=\frac{d}{dx}(\log_4 x^2)=\frac{d}{dx}\frac{\ln x^2}{\ln 4}=\frac{d}{dx}\left[\left(\frac{2}{\ln 4}\right)(\ln x)\right]$

$=\frac{2}{\ln 4}\cdot\frac{1}{x}=\frac{2}{x\ln 4}=\frac{1}{x\ln 2}$

23. $\frac{dy}{dx}=\frac{d}{dx}\log_2\left(\frac{1}{x}\right)=\frac{d}{dx}(-\log_2 x)=-\frac{1}{x\ln 2},\ x>0$

29. $m=5$

$y=3^x+1$

$y'=3^x\ln 3=5$

$x=1.379$

$y=3^{1.379}+1=5.551$

(1.379, 5.551)

37. $\frac{d}{dx}\ln(x+2)=\frac{1}{u}\frac{du}{dx}$

$\frac{d}{dx}\ln(u)$ $\quad u=x+2$

$f'(x)=\frac{1}{x+2}$ $\quad \frac{du}{dx}=1$

$x+2>0$

$x>-2$