HW 3.9 p. 178 #6, 10, 24, 30, 33, 44, 47

Sunday, November 2, 2014 9:55 PM

(6) $y = e^{-\frac{x}{4}}$

$\frac{dy}{dx} = e^{-\frac{x}{4}} \cdot -\frac{1}{4}$

$= \boxed{-\frac{1}{4}e^{-\frac{x}{4}}}$

(10) $y = e^{(x^2)}$

$\frac{dy}{dx} = e^{x^2} \cdot 2x$

$= \boxed{2xe^{x^2}}$

(24) $y = \frac{1}{\log_2 x} = (\log_2 x)^{-1}$

$\frac{dy}{dx} = -1(\log_2 x)^{-2} \cdot \frac{1}{x \ln 2} \cdot 1$

$= \boxed{\frac{-1}{(\log_2 x)^2 x \ln 2}}$

(30) $y = 2e^x - 1$

$\perp$ to $y = -3x + 2$

$\perp m = \frac{1}{3}$

$\frac{dy}{dx} = 2e^x = \frac{1}{3}$

$e^x = \frac{1}{6}$

$\ln \frac{1}{6} = x$

$x \approx -1.792$

$y = 2e^x - 1 \; x = -.6667$

$\boxed{(-1.792, -.6667)}$

(33) $y = x^{\pi}$ power Rule

$\frac{dy}{dx} = \boxed{\pi x^{\pi - 1}}$

(44) $y = x^{\tan x}, \; x > 0$

$\ln y = \ln x^{\tan x}$

$\frac{d}{dx}[\ln y = \tan x \ln x]$

$\frac{1}{y} \cdot \frac{dy}{dx} = \sec^2 x \ln x + \tan x \cdot \frac{1}{x}$

$\frac{dy}{dx} = y\left[\sec^2 x \ln x + \frac{\tan x}{x}\right]$

$= \boxed{x^{\tan x}\left[\sec^2 x \ln x + \frac{\tan x}{x}\right]}$

(47) $y = x^{\ln x}$

$\ln y = \ln x^{\ln x}$

$\frac{d}{dx}[\ln y = \ln x \cdot \ln x]$

$\frac{d}{dx}\left[\ln y = \ln x \cdot \ln x\right]$

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

$\frac{1}{y}\frac{dy}{dx} = \frac{2\ln x}{x}$

$\frac{dy}{dx} = y \cdot \frac{2\ln x}{x}$

$= \boxed{\frac{x^{\ln x} \cdot 2\ln x}{x}}$

$= \boxed{x^{\tan x}\left[\sec^2 x \ln x + \frac{\tan x}{x}\right]}$