HW 8 7.2 #44, 50 7.3 #10, 26, 52

7.2 #44 $y = \sqrt{1 + xe^{-2x}}$

$$y' = \frac{1}{2}\left(1 + xe^{-2x}\right)^{-1/2} \cdot \left(e^{-2x} + xe^{-2x}(-2)\right)$$

$$= \frac{1 - 2x}{2e^{2x}\sqrt{1 + xe^{-2x}}}$$

50. $xe^y + ye^x = 1$

Tangent line at $(0,1)$?

$$\frac{d}{dx}\left(xe^y + ye^x\right) = \frac{d}{dx}(1)$$

$$e^y + xe^y y' + y'e^x + ye^x = 0$$

$$y'\left(xe^y + e^x\right) = -e^y - ye^x$$

$$y' = \frac{-e^y - ye^x}{xe^y + e^x}$$

At $(0,1)$, $y' = \frac{-e-1}{1} = -(e+1)$

$\boxed{y = -(e+1)x + 1}$ is the tangent line at $(0,1)$.

7.3 #10 $\ln\sqrt{a(b^2+c^2)} = \frac{1}{2}\ln\left(a(b^2+c^2)\right)$

$$= \frac{1}{2}\left(\ln a + \ln\left(b^2+c^2\right)\right)$$

26. (a) $e^{2x+3} - 7 = 0$

$e^{2x+3} = 7$

$2x+3 = \ln 7$

$$x = \frac{\ln 7 - 3}{2}$$

(b) $\ln(5-2x) = -3$

$e^{\ln(5-2x)} = e^{-3}$

$5-2x = e^{-3}$

$5 - e^{-3} = 2x$

$$x = \frac{5 - e^{-3}}{2}$$

52. $f(x) = \ln x + \ln(2-x)$

Domain: $x > 0$ and $2-x > 0$

$2 > x$

The Domain of f is $(0, 2)$