Solutions of 3.11

11. $\sinh x \cosh y + \cosh x + \sinh$
$y = [\frac{1}{2}(e^x - e^{-x})][\frac{1}{2}(e^y + e^{-y})] + [\frac{1}{2}(e^x + e^{-x})][\frac{1}{2}(e^y - e^{-y})]$
$= [\frac{1}{4}(e^{x+y} + e^{x-y} - e^{-x+y} - e^{-x-y})] + [\frac{1}{4}(e^{x+y} - e^{x-y} + e^{-x+y} - e^{-x-y})]$
$= [\frac{1}{2}(e^{x+y} - e^{-x-y})] = \sinh(x+y)$

38. $y' = \sinh x \cosh(\cosh x)$

54. $\lim_{x\to\infty} \frac{\sinh x}{e^x} = \lim_{x\to\infty} \frac{\frac{1-e^{-2x}}{2}}{1} = \frac{1}{2}$

55. $y' = \sinh x = 1 \Rightarrow e^{2x} - 2e^x - 1 = 0 \Rightarrow e^x = 1 + \sqrt{2}$
Ans:$(ln(1+\sqrt{2}), \sqrt{2})$

56. $\cosh x = \frac{1}{2}[\sec\theta + \tan\theta - \frac{1}{\sec\theta + \tan\theta}] = \frac{1}{2}[\frac{1+\sin\theta}{\cos\theta} + \frac{\cos\theta}{1+\sin\theta}] =$
$\frac{1}{2}[\frac{\cos\theta + \sin\theta\cos\theta}{\cos^2\theta} + \frac{\cos\theta - \sin\theta\cos\theta}{\cos^2\theta}] = \sec\theta$