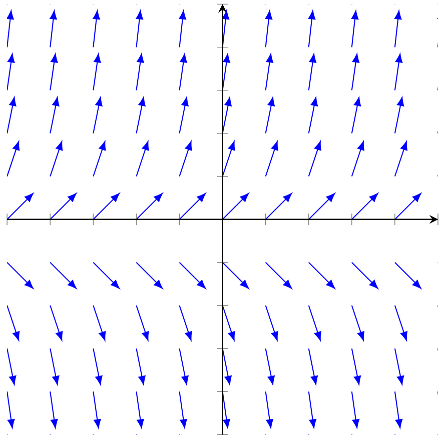
Chapter 1.1

4.) The slope field for $y' = 1 + 2y$:



If $y = -\frac{1}{2}$, then as $t \to \infty$, y will remain $-\frac{1}{2}$. If $y > -\frac{1}{2}$, then y will approach ∞, and if $y < -\frac{1}{2}$, y will approach $-\infty$.

11.) j

12.) c

13.) g

14.) b

15.) h

16.) e

Chapter 1.3

1.) 2^{nd} order, linear

2.) 2^{nd} order, nonlinear

3.) 4^{th} order, linear

4.) 2^{nd} order, nonlinear

5.) $\dfrac{d^2}{dt^2}\left[e^t\right] = e^t$, $e^t - e^t = 0$,
$\dfrac{d^2}{dt^2}\left[\cosh t\right] = \cosh t$, $\cosh t - \cosh t = 0$,
Thus e^t and $\cosh t$ are valid solutions.

6.) $\dfrac{d}{dt}\left[e^{-3t}\right] = -3e^{-3t}$, $\dfrac{d^2}{dt^2}\left[e^{-3t}\right] = 9e^{-3t}$, $9e^{-3t} - 6e^{-3t} - 3e^{-3t} = 9e^{-3t} - 9e^{-3t} = 0$,
$e^t + 2e^t - 3e^t = 3e^t - 3e^t = 0$,
Thus e^{-3t} and e^t are valid solutions.

11.) Since $\dfrac{d}{dt}\left[e^{rt}\right] = re^{rt}$, we can substitute and find that $re^{rt} + 2e^{rt} = 0$, thus $r + 2 = 0$, thus $r = -2$.