

## Calculus 112 Practice Problems

### Section 11.1 Problems #4, #8

4. Differentiating  $y(x) = Ae^{\lambda x}$  gives

$$y'(x) = A\lambda e^{\lambda x} = \lambda(Ae^{\lambda x}) = \lambda y.$$

Therefore,  $y(x)$  is a solution of  $y' = \lambda y$  for any value of  $A$ .

8. If  $y = \cos \omega t$ , then

$$\frac{dy}{dt} = -\omega \sin \omega t, \quad \frac{d^2y}{dt^2} = -\omega^2 \cos \omega t.$$

Thus, if  $\frac{d^2y}{dt^2} + 9y = 0$ , then

$$\begin{aligned} -\omega^2 \cos \omega t + 9 \cos \omega t &= 0 \\ (9 - \omega^2) \cos \omega t &= 0. \end{aligned}$$

Thus  $9 - \omega^2 = 0$ , or  $\omega^2 = 9$ , so  $\omega = \pm 3$ .