

1) *Section 2.4 Problems* 1. (p. 76)

2) *Section 2.4 Problems* 15. (p.76)

a) $yy'' + 3(y')^2 = 0$

Set $u = \frac{dy}{dx}$

$$\rightarrow y'' = \frac{d}{dx} \left[\frac{dy}{dx} \right] = \frac{du}{dx} = \frac{du}{dy} \frac{dy}{dx} = u \frac{du}{dy} \rightarrow yu \frac{du}{dy} + 3(u)^2 = 0$$

$$\rightarrow \frac{du}{u} = -\frac{3dy}{y} \text{ a separable equation}$$

$$\rightarrow \ln|u| = -3\ln|y| + C, \ln|u| + 3\ln|y| = C, \ln|uy^3| = C, uy^3 = \pm e^C = K$$

$$\rightarrow y^3 \frac{dy}{dx} = K, y^3 dy = K dx, \rightarrow y^4 = 4Kx + 4C = c_1 x + c_2$$

Now it's your turn to solve b) and d)

3) Find a second-order differential equation having the function as general solution (*Section 2.4 Problems* 32.) (p.82)

a) $c_1 e^{-2x} + c_2 e^{3x}$

\rightarrow the roots of the *characteristic equation* are $\lambda_1 = -2, \lambda_2 = 3$

\rightarrow the *characteristic equation* is $(\lambda + 2)(\lambda - 3) = 0, \lambda^2 - \lambda - 6 = 0$

\rightarrow the differential equation is $y'' - y' - 6y = 0$

Now it is your turn to solve b) and c)

4) *Section 2.5 Problems* 1. (p.85)

記得提早動筆，準時(11/24)繳交！