Answer Key for **HW 7**

1. [10 pts]

(i) [2.5 pts] (Proof) – 1 pt each, 0.5 for attempt

(ii) [2.5 pts]

$$W = -\frac{3}{2}, \quad \text{Independent since } W \neq 0$$

(1.5 pts)   (1 pts)

(iii) [2.5 pts]

$$\begin{cases} \tilde{y}_1(t) = \frac{2}{3}\sqrt{t} + \frac{1}{3t} \\ \tilde{y}_2(t) = \frac{2}{3}\sqrt{t} - \frac{2}{3t} \end{cases} \quad \text{(1 pt each, 0.5 for attempt)}$$

(iv) [2.5 pts]

$$y(t) = \frac{2}{3}\sqrt{t} - \frac{8}{3t}$$

3. [10 pts]

(i) [3 pts] (Proof) – 1 pt each, 1 for attempt

(ii) [3 pts]

$$W = e \text{ (natural constant)}, \quad \text{Independent since } W \neq 0$$

(1.5 pts)   (1 pts)

(iii) [4 pts]

$$y(t) = -2t + \frac{2}{e}te^t \ (= 2t(e^{t-1} - 1))$$

(0.5 pts for attempt)

6. [10 pts]

(i) [3 pts – 0.5 pts for each]

$$z + w = 3 + 5i, \ z^2 = 7 + 24i, \ zw = -10 + 5i, \ \frac{z}{w} = \frac{2}{5} - \frac{11}{5}i, \ \frac{w}{z} = \frac{2}{25} + \frac{11}{25}i, \ \bar{z} = 4 - 3i$$

(ii) [4 pts – 2 pts for each]

$$z = 4 + 3i = 5(\cos 36.87° + i\sin 36.87°) = 5(\cos 0.64 + i\sin 0.64)$$

$$w = -1 + 2i = \sqrt{5}(\cos 116.57° + i\sin 116.57°) = \sqrt{5}(\cos 2.04 + i\sin 2.04)$$

(iii) [3 pts – 1 pt for each]

$$(\lambda_1, \lambda_2) = (-1 + 3i, -1 - 3i) \quad (or\ (-1 - 3i, -1 + 3i))$$

$$\overline{\lambda_1} = \overline{-1 + 3i} = -1 - 3i = \lambda_2$$