

Part 3

$$U(z) = \frac{z}{z-1}$$

$$Y(z) = \frac{z^2 + z}{z^2 - 0.5z + 0.125} \cdot \frac{z}{z-1}$$

$$= \frac{z(z^2 + z)}{(z-1)(z^2 - 0.5z + 0.125)}$$

$$\frac{Y(z)}{z} = \frac{z^2 + z}{(z-1)(z^2 - 0.5z + 0.125)} \leftarrow$$

$$= \frac{r_1}{z-1} + \frac{r_2}{z - (0.25 - j0.25)} + \frac{r_2^*}{z - (0.25 + j0.25)}$$

$$r_1 = 3.2$$

$$r_2 = -1.1 + j0.3 \quad H(z) = \frac{3.2}{z-1} + \frac{r_2}{z - (0.25 - j0.25)} + \frac{r_2^*}{z - (0.25 + j0.25)}$$

$$r_3 = -1.1 - j0.3$$

$$H(z) = 3.2 \frac{z}{z-1} + \frac{r_2 z}{z - (0.25 - j0.25)} + \frac{r_3 z}{z - (0.25 + j0.25)}$$

$$h[n] = 3.2 u_0[n] + \left(\frac{-\sqrt{2}}{4}\right)^n \left(2.2 \cos^{n\pi/4} + 0.6 \sin^{n\pi/4}\right) u_0[n]$$