Prelim Summer 2017, Q3 5894 3710 0798 9034

Part 3

$$P(z) = (z-u_1)(z-u_2)$$
$$= (z^2 - u_1 z - u_2 z + u_1 u_2)$$
$$= z^2 - (u_1 + u_2) z + u_1 u_2$$

$$P(z) = z^2 - (d_1) z - d_2$$

$$u_1 + u_2 = d_1 \quad EQ\#1$$
and
$$u_1 u_2 = d_2 \quad EQ\#2$$

solve EQ#1 $u_1 = d_1 - u_2$

solve EQ#2 $(d_1 - u_2)(u_2) = -d_2$

$$d_1 u_2 - u_2^2 = -d_2$$

$$\boxed{u_2^2 - d_1 u_2 - d_2 = 0}$$

Quadratic EQ

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \qquad a=1 \quad b=-d_1 \quad c=-d_2$$

$$u_2 = \frac{-(-d_1) \pm \sqrt{(-d_1)^2 - 4(1)(-d_2)}}{2(1)}$$

$$u_2 = \frac{(d_1) \pm \sqrt{d_1^2 + 4d_2}}{2}$$

$$u_1 = d_1 - \frac{d_1 \pm \sqrt{d_1^2 + 4d_2}}{2}$$