Solution Exercise 1

① $e(n) = s(n) + 0.25\, s(n-2)$ (1)

a) We know that,

$$e_m(n) = s_m(n) - \sum_{k=1}^{p} a_k s_m(n-k) \quad (2)$$

Comparing (1) & (2) we get:

$a_1 = 0$

$a_2 = -0.25$ ← negative

$$A(z) = 1 - \sum_{k=1}^{p} a_k z^{-k}$$

$$\Rightarrow \boxed{A(z) = 1 + 0.25 z^{-2}}$$

b) $H(z) = 1.25$ for $z = e^{j\omega}$

$$H(z) = \frac{G}{A(z)} = \frac{G}{1+0.25z^{-2}} \Rightarrow H(e^{j\omega}) = \frac{1}{1+0.25e^{-2j\omega}}$$

$$\Rightarrow H(e^{j0}) = \frac{1}{1+0.25} = 0.8$$

Therefore, $\boxed{H(z) = \dfrac{0.8}{1+0.25z^{-2}}}$

Solving is part of the scope.

c) In order to find formants we look for the roots of $H(z) \Rightarrow 1+0.25z^{-2} \Rightarrow$ We know that $z = e^{j\omega}$