1A $Y_t = Y_{t-1} - 0.25Y_{t-2} + e_t - 0.1e_{t-1}$

$p=2 \quad q=1 \quad \phi_1 = 1 \quad \phi_2 = 0.25$

$\theta_1 = {}^-0.1$

1B $Y_t = 0.5Y_{t-1} - 0.5Y_{t-2} + e_t - 0.5e_{t-1} + 0.25e_{t-2}$

$p=2 \quad q=2 \quad \phi_2 = {}^-0.5 \quad \phi_2 = 0.5$

$\theta_1 = {}^-0.5 \quad \theta_2 = 0.25$

2A $Y_t = 0.64Y_{t-2} + e_t - 0.8e_{t-1}$

ARMA(2,1)

2B $\phi(B) = 1 - 0.64B^2$

$1 - 0.64B^2 = 0$

$1 = 0.64B^2$

$\frac{1}{0.64} = B^2$

$\sqrt{\frac{1}{0.64}} = B$

$\pm 1.25 = B \Rightarrow$ causal because roots are > 1
also stationary for same reason

3A $(1-0.8B)(1-1.2B)(1-B)Y_t = e_t$

$\phi(B)Y_t = \theta(B)e_t$

$\phi(B) = (1-0.8B)(1-1.2B)(1-B)$

$\theta(B) = 1 \Rightarrow$ $\boxed{\text{Not an ARMA model because } (1-B) \text{ is unit root}}$

3B Not stationary because $(1-B)$ is a unit root

4 $(1-\phi B)Y_t = (1-\theta B)e_t \qquad X_t = (1-\gamma B)Y_t$

$Y_T = \frac{1-\theta B}{1-\phi B} e_t$

$$\boxed{\begin{array}{l} X_t = (1-\gamma B)\left(\frac{1-\theta B}{1-\phi B}\right)e_t \\ p = 1 \\ q = 2 \end{array}}$$