1 Question 1.

Assume that y_t follows a stationary AR(1) process:

$$y_t = c + ay_{t-1} + u_t$$

1) Derive the formula for producing $h - steps$ forecasts, $\hat{y}_{T+h|T}$.
2) Now suppose that $c = 0$ and $a = 0.7$ and $y_T = 5$. Compute the forecast for $h = 1, 2$ and 30.

2 Question 2.

Assume that y_t and x_t follow a stationary VAR(1) process with no intercept:

$$y_t = ay_{t-1} + bx_{t-1} + u_{1,t}$$

$$x_t = cy_{t-1} + dx_{t-1} + u_{2,t}$$

1) Derive the formula for producing $1 - step$ forecasts, for y_t and x_t, that is $\hat{y}_{T+1|T}$ and $\hat{x}_{T+1|T}$.
2) Show that two-steps ahead forecast for y_t can be written as:

$$\hat{y}_{T+2|T} = \delta_1 y_T + \delta_2 x_T$$

and provide the expressions for δ_1 and δ_2 in terms of the coefficients of the VAR
3) Now derive the expression for direct 2 steps ahead forecast from the following model:

$$y_t = ay_{t-1} + bx_{t-1} + u_t$$

explain why they might differ from those obtained in point (2)