ASSIGNMENT 1

1.1.

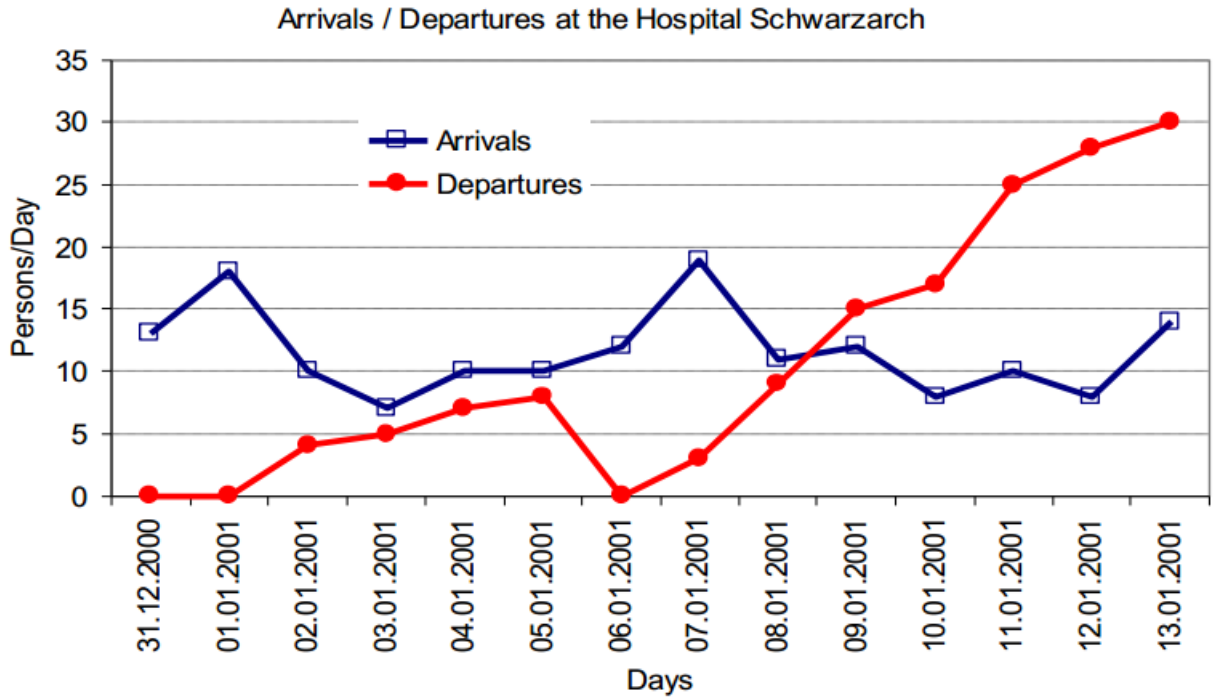
Which of the variables below are stocks and which are flows? Give your answer in terms of SFDs where you name the stocks and the flows (draw on paper!). Hint: Use the snapshot method, that is, imagine that you take a picture of the situation. What can be "seen" in the picture is normally a stocks and what cannot be "seen" is normally a flow (in a picture you can see the water level in the lake, but you cannot see how fast the river flows into the lake as it crosses a thin border between the two. Sometimes a better hint is to consider if something can accumulate over time (or can be stored), if so, it is a stock.

a) a lake, a river flowing into the lake and a river flowing out ;
b) oil production, underground oil reservoir, oil storage ;
c) students in the lab, students entering, students leaving ;
d) ordering of equipment, scrapping of equipment, equipment in place ;
e) withdrawals, bank account, deposits ;
f) mature fish, maturation, natural death, young fish ;
g) knowledge of words, learning words, forgetting words ;

Suggest units for all the variables. Many answers could be correct, for example for the content of a bathtub (stock): *cubic meters, litres, gallons*, and for the water flowing in or out (flows): *litres per minute, litres per hour, cubic meters per day*. Make sure that stocks and connecting flows measure the same thing!

1.2.

Look at the following diagram, which shows arrivals and departures from the hospital in Schwarzarch, at the two first weeks of the skiing season, from Dec.31 to Jan.13.



Draw a SFD and use this to explain your answers to the following questions:

- **a)** What day did most patients arrive?
- **b)** What day did fewest patients arrive?
- **c)** What day did most patients depart?
- **d)** What day did fewest patients depart?
- **e)** What day were there most patients in the hospital?

f) What day were there fewest patients in the hospital considering the entire period from the morning of 31.12.2000 to the afternoon of 13.01.2001?

1.3.

Think of two persons N and S. N thinks of the world as consisting of only instantaneous cause and effect relationships, S thinks of the world as consisting of only stock and flow relationships. Think of system where Y is caused by X.

a) What would N assume about X when she observes a steady increase in Y?
b) What would S assume about X when she observes a steady increase in Y?
c) If in reality Y is a stock, explain the frustration of N.
d) If in in reality Y is not a stock, explain the frustration of S.