Performance modelling of a small medical center.

A small medical center, has a receptionist and three doctors, (we will call them Doctor X, Doctor Y and Doctor Z). Doctor Y works with a nurse, who prepares the patients for the visit. After studying the system, they have measured the following timings and performances:

Receptionist	1 minute per patient
Doctor X	15 minutes per patient
Doctor Y	18 minutes per patient
Doctor Y's nurse	2 minutes per patient
Doctor Z	30 minutes per patient

Fraction of patients needing Doctor X	60%
Fraction of patients needing Doctor Y	20%
Fraction of patients needing Doctor X	20%

Questions:

1. Which is the maximum arrival rate (patients per minute) that this medical center can handle?
2. Study the average time each patient will spend in the medical center as function of the arrival rate. Plot it and include a snapshot.
3. Is it worth separating the Nurse from the Doctor when modelling the visits of Doctor Y? Motivate your answer.
4. Add a Picture of your queueing network model.
5. There is the opportunity of hiring a new doctor, with the specialization of either Doctor X, Doctor Y or Doctor Z. Which one should be hired to reduce system response time?
6. Which will be the new maximum arrival rate in this case?
7. Add a Picture of the modified queueing network.
8. Add a plot of the average time each patient will spend in the medical center as function of the arrival rate.

Please enter the answers, together with a ZIP file containing the .jsimg files of your models, renamed with PPTX extension, in the following form:

https://forms.office.com/Pages/ResponsePage.aspx?id=K3EXCvNtXUKAjjCd8ope67-7CBR7gDJEgHF_krAEqPhUMTZJVkwyNElKRzkwTFFOUzQ5VVU4UklEQy4u

The deadline is **Midnight, 27/09/2025**