A government office is responsible for reviewing applications for rebates supporting the installation of solar panels on buildings. A clerk first receives the application and creates electronic files. If the application is submitted by a commercial building owner, the clerk forwards it to a reviewer specifically trained to review such applications. Applications submitted by residential homeowners are forwarded for either a cursory review if the rebate is less than $1,000 or a more thorough review if more than $1,000. If the reviewer believes that the application is incomplete, the application is rejected and does not proceed further in the process. If the reviewer deems the application complete and satisfactory then the application is forwarded to an electrician who reviews the technical information to confirm that the installation is safe and energy-efficient. If the electrician isn't satisfied by the submitted technical information, he may reject the application. Lastly, a senior program administrator approves or denies the application. A total of 60% of all applications are submitted by residential homeowners. Of those, 40% are over $1,000. Detailed problem information is provided in the tables below...

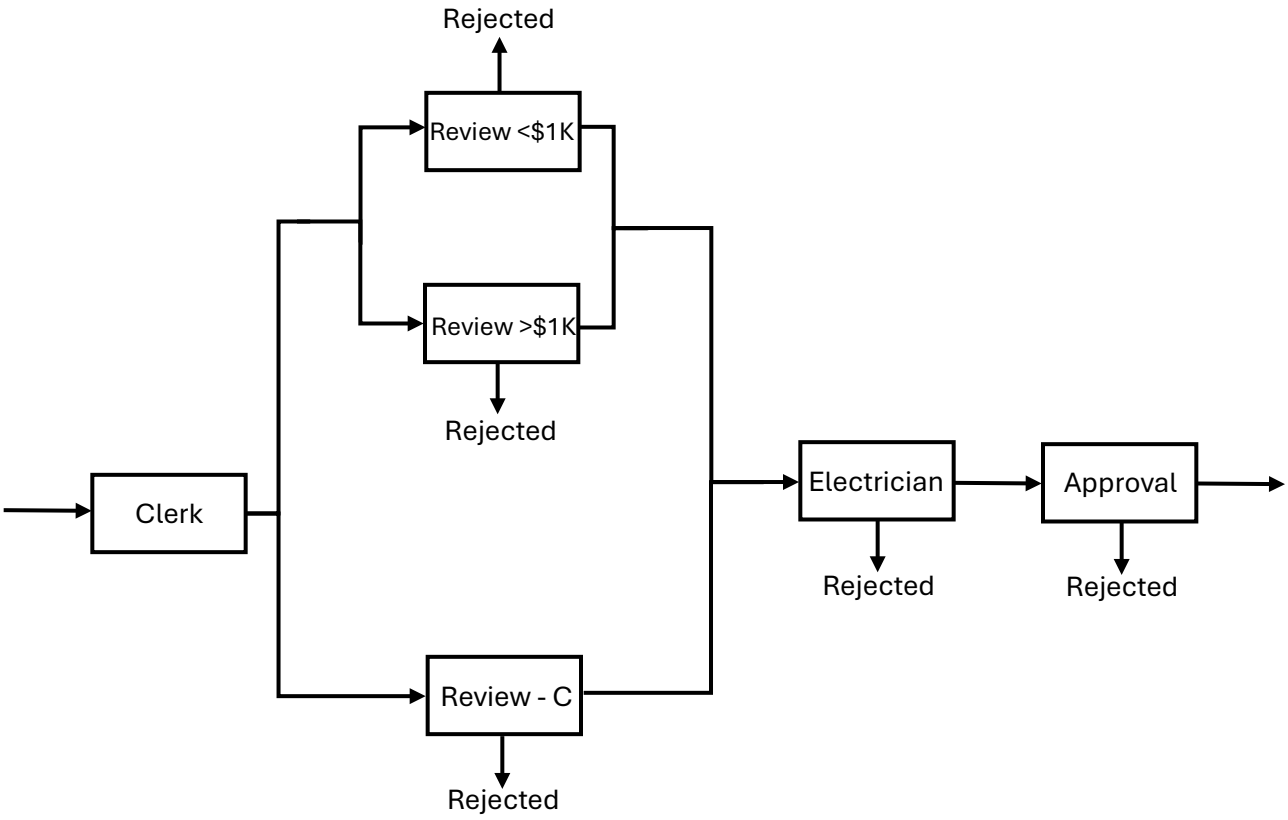
		Residential				
	Clerk	Review <$1K	Review >$1K	Commercial Review	Electrician	Approval
Number of Employees	5	12	15	20	24	8
Unit Processing Time	10 min	30 min	45 min	1.5 hours	1 hour	10 min
Number of hours per day per Employee	8	8	8	4	5	3
Rejection Rate	10%	60%	50%	10%	15%	5%

a) What is the capacity of each individual stage of the process?

		Residential				
	Clerk	Review <$1K	Review >$1K	Commercial Review	Electrician	Approval
Capacity (units/day)						

b) What is the process capacity in units per day?

c) Supposing that the entrance flowrate is actually 200 applications per day, what is the utilization among electricians?



The image below depicts the manufacturing process operated by P&H Manufacturing to produce alloy hubs used in high-end automobiles. The company operates two machining centres annotated below as “Centre 1” and “Centre 2”. After being machined, the hubs move to the finishing centre where they are polished. Lastly, they are packaged and palletized. The time required to complete maintenance and swap machine tools at the machining centres is 30 minutes each.

After 45 hubs are packaged, 30 minutes are required to assemble them on a pallet and prepare the pallet for shipping.

a) Suppose that the two machining centres are identical. How many hubs should be machined out before production is stopped at one to undertake maintenance if we want to minimize inventory levels without reducing the process capacity?

	Unit Processing Time (minutes)
Centre 1	5
Centre 2	5
Finishing	4
Packaging	2

b) Suppose the machining centres are getting old and maintenance is increasing. The company has decided to replace “Centre 1” with a new high-speed machining centre that reduces the unit processing time by 40%. The company can only afford one new machine so the second Centre remains the original. The batch size at the new machining centre is 10 units and the setup time remains 30 mins. However, due to deterioration, the unit processing time at the older centre is now 6 minutes and it requires 240 minutes of maintenance between batches. What should the new batch size be at Centre 2?