Bank Service Problem

The bank manager is trying to improve customer satisfaction by offering better service. Management wants the average customer to wait less than 2 minutes for service. The bank estimates it serves about 150 customers per day. The existing arrival and service times are given in the tables below.

Time between arrival (min.)	Probability
0	0.10
1	0.15
2	0.10
3	0.35
4	0.25
5	0.05

Service Time (min.)	Probability
1	0.25
2	0.20
3	0.40
4	0.15

1. Simulate one day's service by printing each person's arrival time and wait time. Make functions that assign arrival and service times to help you do this.

2. Determine if the current customer service is satisfactory according to the manager guidelines.

3. Simulate 1000 days of service. Calculate the average wait time.

4. Determine several possible changes required to accomplish the manager's goal. These suggestions might involve implementing bank changes that affect arrival or service time probability distributions or adding more tellers.

5. Write a 1-2 page non-technical paper describing your suggestions to the manager. They should address how the changes should be implemented as well as discussing the practicality of the suggestions. Make a business case!

Division of Group Labor:
Everyone must contribute significantly to writing the code. These contributions can be broken up by experience level. For example, group members less experienced with coding can be in charge of writing functions that assign arrival and service times. They can also play around with editing service time probabilities in order to meet the manager's goal. The most experienced coder in the group should be in charge of adding a second teller.

Pencil & Paper:
 Before you touch your computer, you should spend a good amount of time with pencil and paper getting a sense for each customer's arrival time, help start time, service time, help end time, and wait time. When you think you have a good idea how this part is working, check in with your teacher for the next task.

Hint #1:

Suppose your first eight customers had the following time between arrival and service time values. Study carefully how the arrival, help start, help end, and wait times are calculated below before you start doing ANY coding:

Customer	Given: Random time between arrivals	Arrival time	Help Start time	Given: Random Service Time	Help End Time	Wait time
1	**0**	0	0	**2**	2	0
2	**3**	3	3	**1**	4	0
3	**5**	8	8	**2**	10	0
4	**0**	8	10	**3**	13	2
5	**1**	9	13	**4**	17	4
6	**2**	11	17	**1**	18	6
7	**5**	16	18	**1**	19	2
8	**4**	20	20	**3**	23	0