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.

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

3. Edit your program to simulate 1000 days of service and calculate the average wait time.

4. Determine the minimal 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 to the bank manager explaining your methodology and suggestions. Include this in the submission of your code.

6. Totally non-required extension if you finish early: There is a graphics package called Turtle Graphics. Can you use it to make a visual representation of the customers in line and being helped? Google "python turtle graphics examples" to learn more. The first examples by Michael0x2a are a good place to start.

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:

Customer	**Random time between arrivals**	Arrival time	Help Start time	**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

Hint #2:

1. Create empty lists for each of the 150 customers' time between arrivals, arrival, service, help start, help end, and wait times.

2. Assign the first customer their values.

3. Give all of the other customers their time between arrival, arrival, and service times based on the probability distributions in the tables above.

4. Update each customer's help start, help end, and wait times. You will need to update differently depending on whether the customer arrived before or after the last persons' service finished.

5. Calculate the average wait time.