There are two airlines with connecting flights from city A to city D. Each connection has a half hour layover. Each airline has connecting flights so that if you miss one connection there are later options. Airline One has a set of flights that leaves at 8:00 and arrives in city D at 20:30, if all goes well. Airline Two has a set of flights that leaves at 8:00 and arrives in City D at 20:00, if all goes well, so Airline Two appears to be the better option.

However, you study the airlines and discover that Airline One might be more liable to arrive on time at the intermediate cities, and that it may be more likely to arrive at D on time since the standard deviation is smaller. Flight times are normally distributed.

$$A \xrightarrow{8:00, \mu = 4, \sigma = .4} B \xrightarrow{12:30, \mu = 4, \sigma = .4} C \xrightarrow{17:00, \mu = 3.5, \sigma = .4} D$$

$$B \xrightarrow{13:00, \mu = 4, \sigma = .4} C \xrightarrow{17:30, \mu = 3.5, \sigma = .4} D$$

$$C \xrightarrow{18:00, \mu = 3.5, \sigma = .4} D$$

Airline One Flights

$$A \xrightarrow{8:00, \mu = 3.5, \sigma = .6} E \xrightarrow{12:00, \mu = 4, \sigma = .6} F \xrightarrow{16:30, \mu = 3.5, \sigma = .6} D$$

$$E \xrightarrow{12:30, \mu = 4, \sigma = .6} F \xrightarrow{17:00, \mu = 3.5, \sigma = .6} D$$

$$F \xrightarrow{17:30, \mu = 3.5, \sigma = .6} D$$

Airline Two Flights

Write a program to simulate the journey from A to D, for each airline, using the data above.

Generate a large number of trials for each airline (maybe 10,000 would be enough), compute the arrival time for the first flight at B or E, and decide which second flight you will be able to take. Compute the arrival time at C or F, decide which third flight you will be able to take, and compute the average arrival time at D for both options. If you arrive at B or E too late to take the second flight, count the trip as having been stranded, and the same for arriving at C or F too late for the third connecting flight. Compare arrival times at city D for the two options. For each option, Airline One and Airline Two, display:

1. average arrival time
2. probability of arriving by 30 minutes after scheduled time (21:00 for Airline One/20:00 for Airline Two)

3. probability of being stranded

You may assume departing flights are at gates next to arrivals, so that if a flight arrives within one minute of departure for the next time, the second flight may be used.

Assume a minimum flight time of $\mu - 3\sigma$, and a maximum time of $\mu + 3\sigma$. If flight times fall out side these limits, change them to the max or min.