Consider a classical inventory system that consists of the purchase and sale of newspapers. The paper seller buys the papers for 33 cents each and sells them for 50 cents each. Newspapers not sold at the end of a day are sold as scrap for 5 cents each. The seller purchases the newspaper in bundles of 10. Thus, the seller can by 40, 50, 60 newspapers and so on. There are three types of news days – 'good,' 'fair,' and 'poor' with probabilities 0.35, 0.45 and 0.20, respectively. The distribution of papers demanded on each of these days is given in Table 1. The problem is to simulate the system for 30 days for determining the optimal number of papers the seller should purchase to maximize the profit.

Table 1: Distribution of newspaper demanded with probability

Demand	Demand probability distribution		
	Good	Fair	Poor
40	0.03	0.10	0.44
50	0.05	0.18	0.22
60	0.15	0.40	0.16
70	0.20	0.20	0.12
80	0.35	0.08	0.06
90	0.15	0.04	0.00
100	0.07	0.00	0.00

The profit is calculated by adding revenues from selling the newspapers and the scraps, and then, subtracting the total loss due to scrap sell and additional loss due excess demand. The excess demands indicates a customer's unsatisfied demand which is the shortage of a newspaper and the amount is assumed as 17 cents, i.e., the availability of the newspaper would produce the profit of 17 cents which the shortage could not produce.

Assume that a randomly selected day is a good, fair and bad newsday with probabilities 0.35, 0.45 and 0.20, respectively.

a)	What are the state variables and output variables for the simulation model?
b)	Identify the set of events for the simulation model.
c)	Write down the state equations and output equations for the simulation model.
d)	Write down the state space for the simulation model.
e)	Draw a sample path of the system for a few initial minutes showing the change of the state variable(s) over time.
f)	Draw separate flow charts of the event routines (i.e., the event handler functions) for each of the events of the system.
g)	Draw the flow chart of the function that updates the necessary statistical variables according to the output equations of the simulation model.