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TABLE 2. RELATION BETWEEN DEMAND CURVE AND SELLING DAY.

Demand Curve (z=)	3	2	2.5	3	3.5	(1 + .5 (Selling Day))
Selling Day	1	2	3	4	5	. . .

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PEDLAR: A COMPUTER GAME IN ECONOMIC ANTHROPOLOGY

Stuart Plattner

PEDLAR

This paper describes an interactive computer game which simulates the behavior of an itinerant peddler. The player and the computer communicate with each other through the keyboard of a remote terminal similar to an electric typewriter. When the game begins the player receives some of the things peddlers need to make a living: some mules cash operating capital, and the ability to buy merchandise on credit. He then begins to buy and sell goods. The player makes decisions at all stages of the game--about the quantity of merchandise to take on the trip, the number of mules to own, the proper price at which to sell goods, and so on. The computer keeps accounts for him, and tells him at periodic intervals how he is doing as an economic actor.

The purpose of playing the game is to introduce the complicated and difficult role of the traderin a poor environment to the student. The theoretical structure of peddling as economic behavior should be more easily appreciated by someone who "tries it out" for a while, and then examines the program. The game was written with that pedagogical purpose in mind, as well as to show students how programming and simulation can aid the analysis of social systems. The interactive simulation prepared the way towards writing a non-interactive simulation of peddling where various theories of peddling behavior could be tested out. This latter research is now underway.

The present work will describe the program with particular reference to those parameters which require ethnographic knowledge for their values. In other words, this paper gives the real-world justification for the particular form and content of the computer program. Since a general description of peddling is given in the previous chapter the introductory material will not be duplicated here, but I assume that the reader is somewhat familiar with the subject.

In the description of the program which follows some conventions will be followed to prevent confusion between the reality and the simulation. The word "peddler" will be used to refer to the observed reality, the world "player" to the simulation, and the word "model" to the structural relations between variables which are thought to underlay both reality and imitation. Pedlar, spelled in the British style with one "d" and an "a," will refer to the program. When sample data is mentioned it will denote a sample of 47 trading trips for which I have relatively complete information, elicited during field trips in 1967 and 1970. References to line numbers (ln) which appear will refer to the listing of the program, in the Basic computer language, which is given in the appendix.

The Structure of the Program

The structure of the program refers to the kinds of events specified in it and the sequence of the events. These should mirror the ethnographically described reality, in order to be useful in understanding that reality. For example, in the program a player possesses mules before he buys his merchandise. The number of mules owned thus constrains the amount of goods he can buy, since mules cannot carry an ever-increasing amount of merchandise. It is easy to visualize this causality reversed, so that one purchases a stock and then obtains transportation service to transport it. The real peddlers in fact do adjust their number of mules to the quantity of goods they can sell in their customary routes, so that in the long run the causality is reversed. But in the short run of the individual trip, the mules owned constrain the goods one carries, and this empirical causality is structured into the program.[1] The overall form of the program is flow-charted in figure 1.

The game begins by assigning the player a number of mules varying randomly between one and three. A credit ceiling in dollars of merchandise is assigned which is based on the number of mules owned, and varies randomly between $150 with one mule to a maximum of $400 with three mules. (The formula used is in ln. 190). The cash operating capital is always set at $50. Thus the structure is that the player possesses capital and mules first and buys merchandise, or sets the short-run scale of his operating, to fit his invested resources.

The player then selects an amount of merchandise to buy for his trip, travels to a rural hamlet, and specifies that day's average markup for his goods (see figure 2 for a flowchart of the selling day subroutine, ln. 3000-3320.) The quantity of goods sold is calculated according to various factors, and relevant income and cost information is printed. Then the player decides whether to stay in that hamlet for another day, to go to another hamlet, or to terminate his trip and return home. If he chooses to return, his net income is calculated, and various expenses such as debts and his family's subsistence costs are deducted from his capital. He can then begin another trip, using his accumulated capital and any left-over merchandise, in addition to a new assortment of purchased goods.

Note that it is possible for a player to go deeply in debt during a trip by selling goods for a net income of less than his total costs, and not be penalized until the end of the trip because all costs are not deducted until he returns home. This was done because the peddlers operate in the same fashion: they take goods out on credit and expect to pay for them at the end of the trip with revenue from their sales. Thus in the program, as in the reality, the true "hour of reckoning" comes at the end of the trip when the revenues from the sale of goods are compared with the actor's amassed debts.

At rare intervals the player experiences good or bad luck. The consequences can range from gaining or losing a mule, a small amount of capital, or a relatively large amount of capital. If the player runs out of money at any point where deductions are made from his capital, the program checks to see if he is able to raise cash by selling a mule. If he only owns one mule, or if the income from selling his other mules is not sufficient to cover his debts, he is informed that he is out of business, and the game ends.

Barring a computer or telecommunications line failure, a player can play indefinitely until he decides to end the game or fails because he has lost his capital. It can take a few hours to play for a year of game-time, but when a year does pass the program compares the player's wealth with the amount he had at the beginning of the year and gives him the result of the comparison.

The Content of the Program

The second component of realism in a simulation is the actual values given to the parameters. For example, mules will be overloaded at some value of merchandise, and this should have consequences for costs. But which amount will be excessive? There are three ways to answer such a question: by direct investigation in the field; by inferences based on statistical analysis of field data; and by "best-guess" estimation. For example, a survey could have been done of a sample of peddlers asking them about overloading and its consequences. Lacking this sort of data, the value could be estimated by using merchandise-per-mule as an independent variable in a regression on trip-costs as the dependent variable (which is the procedure used in the present case--see below). Or, the values could be estimated on the basis of one's general ethnographic and theoretical familiarity with the subject. These values would then be hypotheses requiring empirical and theoretical (via simulation) testing. An example of this would be to base the values on comparable load figures for mules in other countries where data exists, estimates of the weight of the average pack, and other factors. All three sorts of procedures have been used in writing the program. While a value scale is implicit in the order of the estimating procedures, with direct study the best alternative and reasonable estimates the "residual" category, I don't mean by this to denigrate the latter. It is all too often the only realistic option in the attempt to specify a complex model. In the remainder of this paper each instance where an "ethnographic" value is set for a variable is examined in detail.

Demand

The heart of the program is the routine which models the Indian consumers' demand for the peddlers' goods. This takes the form of a series of equations which set the quantity of goods sold at a particular time and in a particular place as a function of the price of the goods. In principle it would have been possible to measure, in the field, various combinations of place, time, price, and sales and determine the underlying demand function which accounts for the data. The technical problems pertaining to this measurement have been of central concern to economists for many years. This was not done in the present case, and so the demand functions in the program are constructed on the basis of general principles.

The type of merchandise sold is a basic determinant of demand and will be considered first. The main commodities sold by peddlers are clothing and cloth used for clothing. These goods are indispensable to the customers, as in most cases they had lost their ability to weave their own cloth many years ago. Since they must have clothes and cannot provide them for themselves, the Indians are dependent upon the peddlers to supply these goods. In this sense the demand for clothing in the program should be price-inelastic, meaning that consumers buy relatively fixed amounts of goods in spite of small changes in price. In addition to their dependence upon the peddlers for the physical provision of their clothing, the consumers are poor and mainly subsistence oriented. This implies that they will try and minimize the importance of purchased goods, since they find it problematical to obtain the necessary cash, and will try and make-do with old clothes for as long as possible. This last factor will tend to depress the total quantity of goods sold in any time period. At first glance it may seem to imply that the demand for purchased goods should be price-elastic, because of the Indians' tenuous connection to the market, so that if prices rise somewhat they will withdraw their trade in response. This way of looking at demand confuses income-elasticity with price-elasticity of demand, however. Due to their poverty the consumers change the quantity of goods purchased with changes in their incomes, buying more things when they earn more income, and reducing purchases in periods of reduced incomes (these factors were mentioned in the previous chapter). But it is plausible to believe that once a poor consumer is finally ready to buy his clothing he "really" needs it. This assumes that the decision to buy new clothes is a complex function of the consumer's wealth as well as the state of disrepair of his old clothes. If a consumer is relatively wealthy, he can buy new articles in anticipation of need, or at the first signs of disrepair. He has a potential overlap period of variable length during which he wants new clothes, and is disposed to buy them, but also has acceptable substitutes for them (i.e., his old clothes). He thus can wait until purchase conditions are favorable to buy his clothes, and so his demand for clothing will be price-elastic in the short run. Poor people, on the other hand, will always have insufficient cash on hand for their total needs. Their condition is best described by a "juggler" model of allocation.[2] Here they will juggle their allocation of cash across their various needs, spending money on that need which is most pressing at that time, perforce ignoring their other needs until each, in turn, becomes so pressing as to overshadow the rest. The analogy to the juggler, catching and tossing each ball in turn only when it threatens to fall to the floor, and by this strategy keeping many balls in the air at the same time, is apt. The juggler overcomes his handicap of having only two hands to toss more than two balls, and the poor consumer overcomes his problem of having only a limited amount of cash to spend on a seemingly enormous need.

If this model of poor peoples' demand for purchased goods is true (and titles like "The Poor Pay More, Caplovitz, 1967, tend to support it), then the poor person finally decides to buy a replacement only when the original is completely unserviceable, as it is only then that the need to replace it becomes more important than the other needs of the day.[3] The poor person in this condition must paradoxically pay whatever price he is confronted with, as he "cannot afford to wait" until he finds a better price. In this case his demand for the good is price-inelastic. Thus, for various reasons the demand functions in the program should be inelastic over most ranges of price.

Before the discussion of the demand functions in the program continues, the nature of merchandise in the program must be explained. The real stock of the peddlers, while it mainly consists of cloth and clothing, includes such diverse items as pots, pans, candy, notions, and on occasion pistols, radios, and even horses. While in principle it is easy to modify the program to include different sorts of merchandise, each with a different demand and supply function, so that the player could develop a strategy related to the particular sort of merchandise he sells, I have not yet done this. For the present, all merchandise in the program is considered to have the economic characteristics of clothing, and is treated as if the stock of each peddler were composed of homogenous units of $1 value each. One hundred units of merchandise cost $100, and if the entire lot is sold at a markup of 35 it will yield a gross revenue of $135.

The discussion of the demand functions can now continue with a consideration of the demand ceiling for each hamlet and the average sales per day. The hamlets in the real ethnographic scene are tiny places, often with populations of less than 250 people. The total quantity of goods sellable in such places is not great, and should be limited in the program to reasonable amounts. In addition, the average sales per day in the program should be constrained to prevent excessive amounts. The sales in a sub-sample of ten trips for which I have this sort of information in detail (i.e., the actual sales for each day of the trip recorded separately) average $18 (standard deviation (SD)=6), while the average daily sales for the entire sample, calculated by dividing total sales by the number of selling days, is $18.17 (SD=15). The markup for the total stock of merchandise, per trip, in the sample averages 34 percent (SD=14) for all trips. Thus the long-run sales per day in the program should be set to about $18 when the markup is about 34 percent. This was done, as a sample run of 1000 simulations of the functions in the program which set the daily sales shows (Table 1). When the markup was set to average 35 and the demand curve (to be defined below) set to average about 3, the program's functions produced an average value of about $18 for daily sales. Thus the conditions created by the program allow the results observed in the reality.

The limit per hamlet was set with reference to data from the small subsample mentioned above. The total average sales per hamlet in the subsample is about $50, but the SD is $60. The best solution, in terms of ethnographic realism and programming convenience, was to set the limit per hamlet at about one SD above the mean of the sample, or $110, and the limit per day at $100. Both of these values are rarely achieved in the operation of the program. The more realistic limit is the largest quantity of goods that can be sold for a positive profit, since the player receives information about the costs at the same time that he gets knowledge of his daily revenue. Sales can be increased by lowering the price, and the conjunction of rising costs (which are, in part, a function of the quantity of sales) and decreasing markup yields a maximum daily sales in the program of less than $90, with optimal sales ranging between $15 and $40, approximately.(Net income as a function of markup is graphed in figure 3.)

Another aspect of the daily sales which must be considered is the <u>rate</u> of sales. I assume that the demand for clothing in any hamlet is mainly determined by the rate of decomposition or wearing-out of the purchased goods owned by each household (with a small input from the desire for novelty and a larger input from the growth of children). As each item becomes unusable, or as each child outgrows his old clothes, the household makes the decision to buy a new item. The relevant aspect of this decision here is that it is "saved" until the appearance of the peddler, since no alternative source of supply is readily available. In this model the peddler appears in a hamlet and confronts a mass of accumulated demand, which has built up slowly since his last trip. An omniscient peddler interested in maximum profits would time his visits (and choose his hamlets) so that he always appeared in all hamlets when the accumulated demand was at its high point, but not so high that it increased the probability significantly that another peddler would trade there at the same time.

Once a peddler arrives on the scene, however, he cannot satisfy the demand for his goods immediately. He is often tired from his trip, and must settled into his rented (or borrowed) room. He must unload, pasture, and care for his cargo animals. In addition the customers may not be prepared to buy on the first day. It takes time for the word of the peddler's arrival to filter through the dispersed homesteads of the hamlet, although this sort of news travels speedily. But then people must collect cash debts, initiate exchanges in order to obtain the necessary cash for purchases, and finalize their decisions about exactly what to buy now that the opportunity is actually at hand. For these reasons I assume that the demand as represented by potential purchases, is a wave-like function of the time of the peddler's visits, as charted in figure 4. The demand falls slowly at first, then with increasing speed, and then slowly again as it becomes satiated. What this means in the context of the program is that the first day's sales should be relatively high, but significantly less than the second day's. The rate of selling should then decrease gradually as people buy all of the goods they want. In addition the probability of any particular sale may decrease the assortment of stock decreases, so that the peddler should find it harder and harder to sell goods as he runs out of specific sizes, colors, and styles. If the peddler stays in any one place long enough, sales should finally reach zero or near it as the Indians in the hamlet actually run out of cash. In the reality many peddlers sell on credit, and future versions of the program will incorporate this selling strategy as well.

The actual relations between price and sales which incorporate the conditions described above are charted in Figure 5 and set in the program by the equation:

$$\text{Quantity of merchandise sold} = 1-(1-(1-\text{markup})^z)^{1/z}$$

This equation describes a straight line descending to the right when the exponent z is set to one (see Figure 5). The z=1 curve is not used in the program and is drawn for illustrative reasons only. When z=2 the equation describes the arc of a circle with its center at markup=100 and quantity=100. The exponent, z, sets the demand relationship for each day of selling in a hamlet, and changes as the number of days the player has been selling in that place increase. This assures that the player encounters varying conditions of demand. The relation between the demand curve exponent and the selling day is given in Table 2.

It would be unrealistic to assume that the peddlers always sell the same quantities of goods at the same prices in the same places. The relation between price and sales must be stochastic in the real world, as many factors influence a consumer's decision to buy goods in addition to those already mentioned. Demand can be increased due to festivals, marriages, and the like, and it can be decreased due to sickness, random accidents, etc. As was mentioned above, the "breadth" of the assortment of stock carried by a peddler influences his probability of selling goods at any particular spot. Sales should tend to be reduced somewhat as the stock assortment declines. Thus the calculation of sales each day is increased by a random factor varying between 0 and 60 percent during the first 10 days of the trip, 0 and 40 percent during the second 10 days, and 0 and 20 percent for the remainder of the trip. As shown in Table 1, the average sales resulting from these algorithms has been set to about $18, with a large standard deviation, to allow the mean and variation observed in the sample data to be matched.

Costs

The other parts of the program in which specific ethnographic observations are relevant have to do with various costs. The first to be mentioned is the opportunity cost of a peddler's (and therefore a player's) labor time. This is mentioned in the introductory remarks of the program as $.65 per day, which is in fact the average wage in the research area for unskilled labor. If a player makes less than that (as some peddlers do) the program points out to him that he is losing money as an independent businessman, because he could have earned more working as a laborer. In real life peddling is worth some potential loss of income, since the alternative work is very low in prestige, and many people prefer a slight sacrifice in income for the significant gain in prestige afforded by being an independent businessman. I should also mention that every peddler has the potential of earning much more at any future time, while the wages from working as a peon will always be marginal. Thus the apparent sacrifice of some short-term income by the peddlers who may be observed to earn less than their opportunity cost of labor, may really be an investment on the probability of earning a much larger long-term income.

The second cost to be discussed is the subsistence expenses incurred by the peddlers' families, since these are deducted from their income in the program at the end of each trip. In the real world, expenses are affected by family size, wealth, and life style, of which only wealth is used in the program. Family costs are calculated as \$.50 per day plus 5 percent of the peddler's capital plus \$5.00 per mule, to take into account both cash and invested capital. For an average trip of 25 days with \$50 cash and one mule, this yields \$20 of family subsistence costs for players with one mule, \$25 for those with two mules, \$30 with three, and so on. The average amount that informants among the peddlers said they spent for food and other family expenses was \$1.20 per day (SD=.38), for a sample of 28. This yields an average of about \$30 in expenses in 25 days, which compares with the formula in the program since the average peddler has three mules.

The next relevant cost is the price of buying a new mule. The average cost of an animal and all the necessary equipment to make it a merchandise transporter is \$110, which was derived from intensive interviewing with a sample of 11 peddlers on their ownership of pack animals. This figure is used in the program in the routine to buy mules (in 1000-1500). The sale value of the mule, or what the peddler could get for it if he had to raise cash, is calculated in the program as \$80 the first year, decreasing \$30 per year afterwards (few players will play more than 2 years). This estimate is taken from the same body of interview data, where depreciation was calculated on a linear basis (i.e., buying cost minus selling cost divided by the number of years of service) plus the costs of a number of days of pasturage in the city. (The routine to sell mules is given in ln 1500-2000).

The amount of merchandise per mule taken on peddling trips in the sample varies greatly. The problem in designing the program was to allow the average empirical amount of merchandise to be attainable and also to establish the outer limit in a reasonable way. The average merchandise-per-mule figure in the sample data is $112 (SD=61.5), while the merchandise taken on trips correlates .69 with the number of mules on the trip. Assuming a normal distribution, about 84 percent of the sample had about $175 or less worth of goods per mule (i.e., one SD above the mean or less). It is likely that some of the peddlers carrying large amounts of merchandise per mule did so because they had superior animals, superior skills as muleteers, or chose high value, low-bulk goods. It is also likely that some of the peddlers overloaded their mules. Since the game contains no opportunity of simulating skill at muleteering or choice of type of goods, the program assumes that large values of merchandise-per-mule are overloading and punishes the player accordingly. If a player buys more than $174 worth of goods per mule his costs rise in proportion to the excess over the limit: for example, if he buys $200 worth of goods with one mule his costs rise by a factor of 200/174, or 1.15 (ln. 3203, 3204). Merchandise below the limit also affects the player's operating costs in a more subtle way, as shown in the calculation of daily costs.

The peddler's operating costs while on a trip are composed of three categories: food for the peddler and his helper, meaning meals and drinks purchased from farm families; feed for animals, composed of pasturage fees and supplementary corn fed to the mules when they are working hard; and wages for hired helpers (who accompany every peddler). On the average, these costs sum to a total of \$40.64 (SD=31.[illegible]) per trip in the sample data. The costs on any trip are influenced by the quantity of merchandise taken, the number of mules, the length of the trip, and the life-style of the peddler and his helpers, which are all highly interrelated variables. For the purposes of the simulation program, I assume that the daily costs are a function of a constant sum plus the daily sales, the number of mules, and a mule overload factor. From the peddler's point of view, he will do everything possible to tie his costs to his sales, so that he incurs lower costs when he creates no income. This is unrealistic since charges for food, feed, and wages will exist during periods when no sales take place, but I assume that the charges will be less on those days. This means, in effect, that the peddler feeds himself and his helper better on days when they work hard and sell a lot of merchandise, for example drinking beer with supper instead of coffee, buying a chicken for a meal in addition to the ubiquitous beans and tortillas, etc. A regression based on this model of costs yielded the following values:

$$\text{Costs per day} = .17\ (\text{constant sum}) + .02\ (\text{total sales}) + .19\ (\text{per mule}) + .25\left(\left(\frac{\text{merchandise}}{\text{mule}}\right) / 117\right)^2.$$

$R^2 = .35$, $F = 7.7$, $N = 47$.

This means that the best estimate of daily costs in the sample data is computed by adding 17 cents (every day) to two percent of that day's total sales plus 19 cents per mule and a factor measuring the deviation from the average in merchandise-per-mule. The last measure is squared on the common assumption that these sorts of costs will not be linearly related to the overload figure, because costs should rise very steeply for high values of overloading. In fact, a non-squared (i.e., linear) measure did not yield as significant a coefficient as the squared one, which validates the assumption. The costs per day in the program are set by the same formula (ln 3202). If the mules are significantly overloaded, meaning more than a standard deviation above the sample average merchandise per mule, the costs are increased as we discussed above. This yields values for daily costs that seem reasonable in light of the sample data. On days when the player is traveling to his selling area his costs are set as .50 per mule per day. On days returning from the selling area cost are set as .33 per mule-day, since the mules are presumably lightly loaded and do not need supplementary feed.

The relations between mules, merchandise, demand curves, and markup as they produce varying quantities of sales, costs, and net incomes per day are all given in Table 3. This table shows various values of the latter variables under different combinations of the former.

The final cost to be mentioned is the cost of credit for unsold merchandise. If a player returns home with unsold goods he is charged ten percent of the cost of the goods to take storage and additional handling losses into account as well as credit charges. The real peddlers often finish a trip with a large portion of their original merchandise still in stock as unsold remnants. These are left in the rural selling area until the next trip. The storage conditions are never perfect, and some losses occur on this account. More losses are attributable to wear-and-tear on the goods under normal conditions of sale. The merchandise is packed in large bundles covered with a canvas tarp, and each bundle is carried during a selling day by the peddler or his helper, on his back with the aid of a tumpline. The bundles are set down in the dirt yards of customers, unpacked, displayed, and repacked as many as thirty times a day. Peddlers are continually unfolding, displaying, and refolding particular items, all of which creates losses in goods. In addition some town wholesalers may charge additional credit if a large part of the peddler's debt is not paid off at the end of one trip. This charge is above the primary charge for credit, which is included in the purchase price of the goods to the peddler. The ten percent charge on unsold merchandise in the program is intended to represent the combined effects of all of these factors.

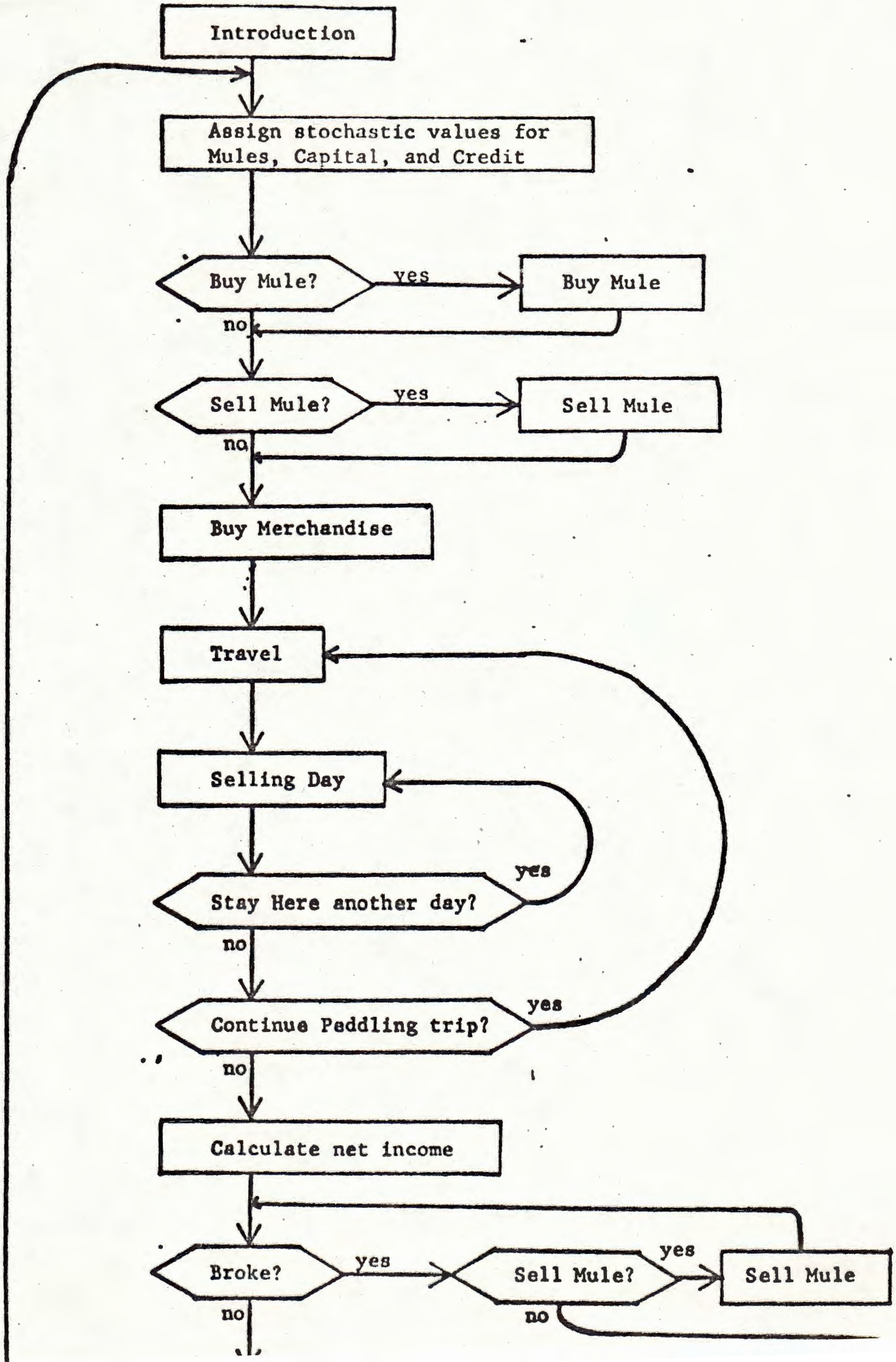
Conclusion

One main reason for writing the program was to interest students in the complexities and subtleties of this kind of economic behavior, and in the use of the computer. Most students who play the game report that they become completely engrossed in the decision problems and enjoy the exercise of trying to figure out the economic "environment" that they find themselves acting in. As an unexpected byproduct, it is interesting to note that many players seem to establish decision rules that can only be called superstitions. They confidently assume causalities and act on parameter values that are in fact erroneous. For example, one player reported that he "goes in with low prices on the first three days and then hits them with high prices on the fourth day, since I'm leaving the next day anyway." The commonality of such reports suggests a further study, using the program as a means of investigating the economic psychology of subjects.

My second purpose in writing the program was to prepare the way for the construction of a model of peddling that will use simple decision rules, such as profit maximization, income satisficing, risk minimization, or some combination of these, and will produce a sample of behavior comparable to what I observed in the field. This research is now taking place.

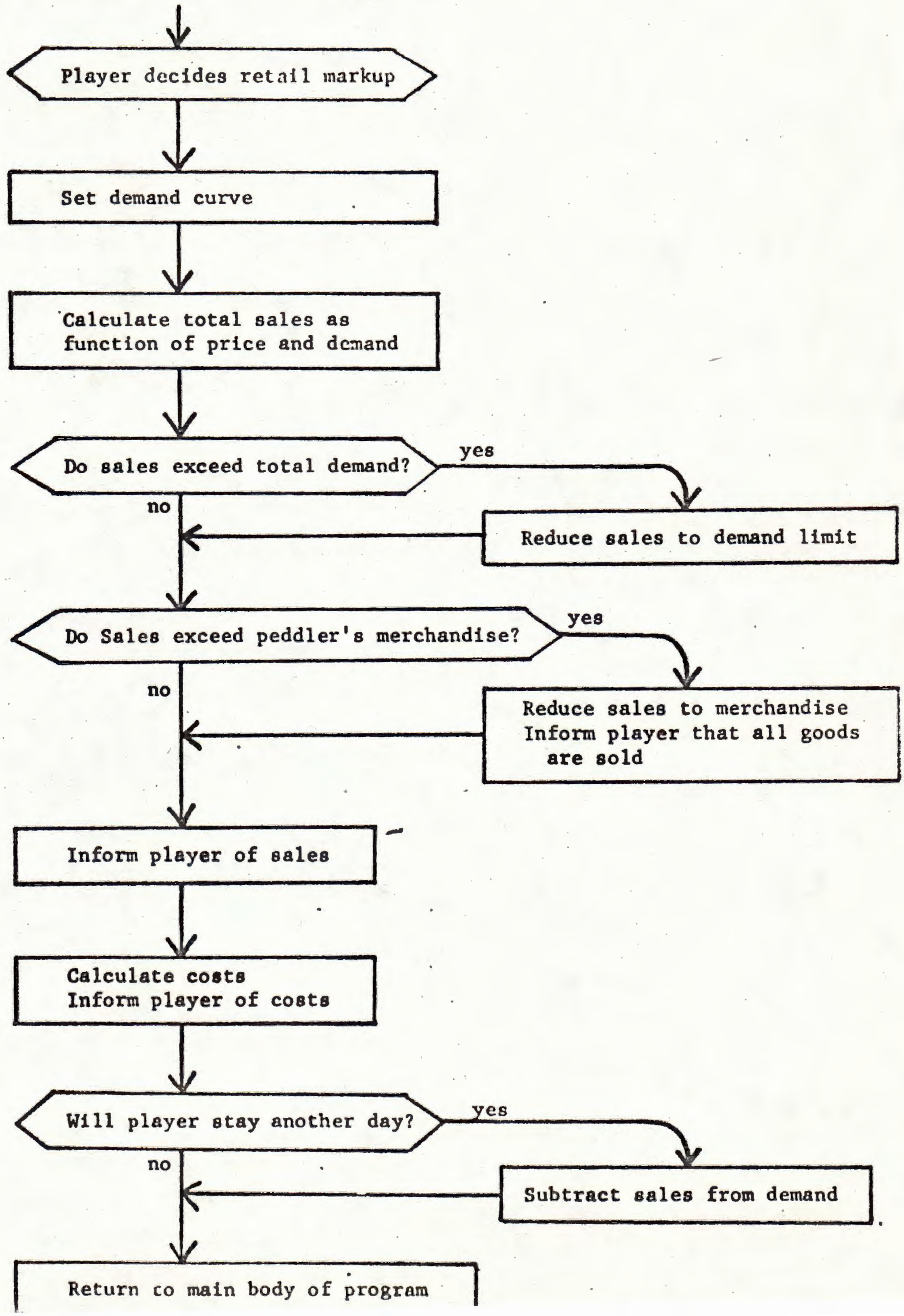
The program is available on paper tape and on IBM selectric magnetic cards to anyone who is interested. Paper tapes will be sent free, and cards sent to the author will be sent back with the program recorded on them. Anyone interested is invited to correspond with the author.

PEDLAR


Introduction
Assign stochastic values for Mules, Capital, and Credit
Buy Mule?
yes
Buy Mule
no
Sell Mule?
yes
Sell Mule
no
Buy Merchandise
Travel
Selling Day
yes
Stay Here another day?
no
yes
Continue Peddling trip?
no
Calculate net income
Broke?
yes
Sell Mule?
yes
Sell Mule
no
no

PEDLAR

Selling Day Subroutine



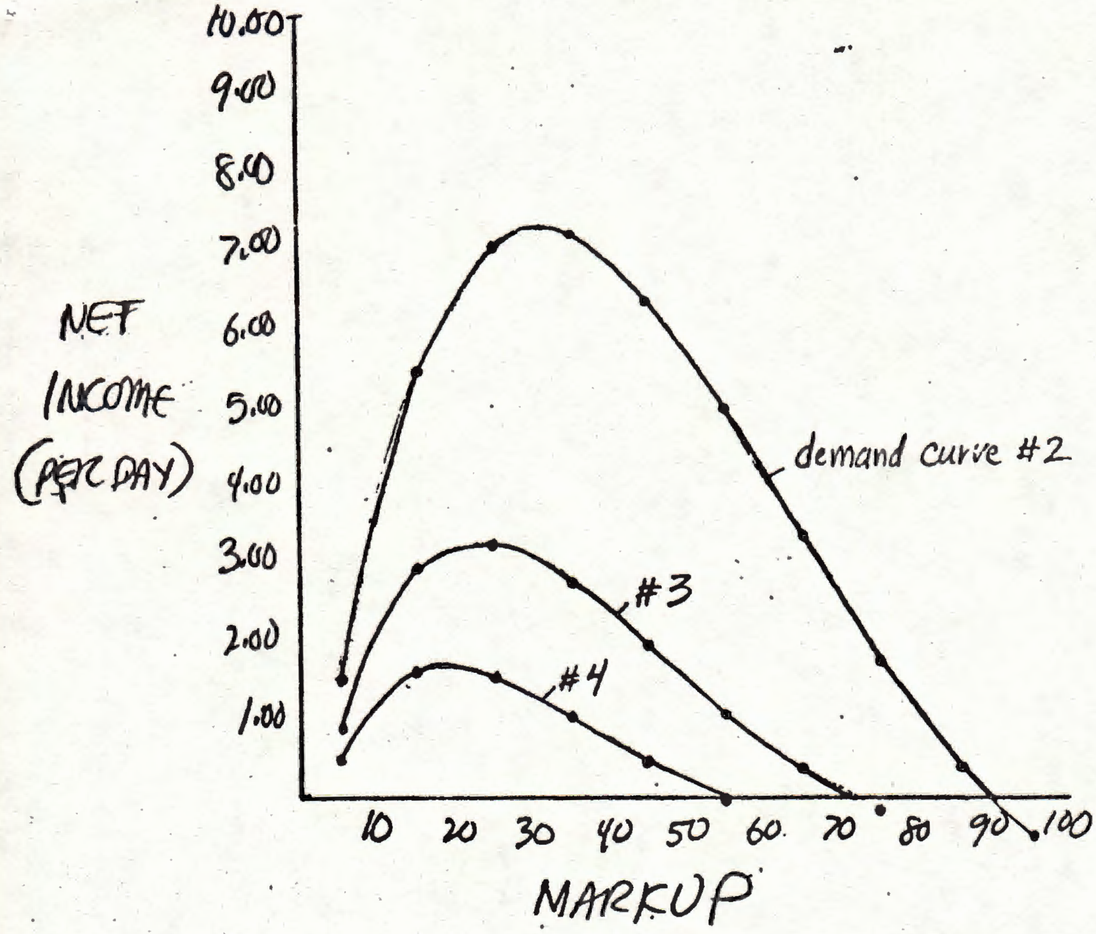
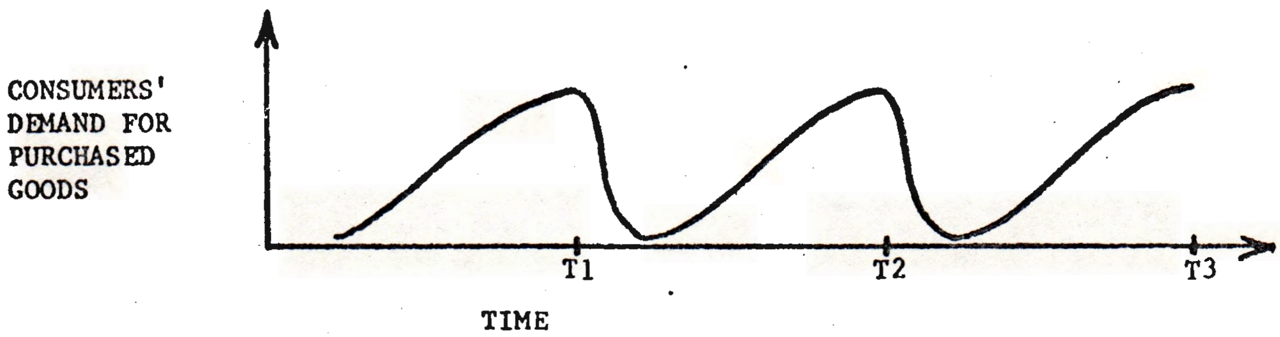


Figure 3. Net Income in Pedlar as a Function of Markup.[1]

1. given one mule and $100 of stock.



* T1,T2,T3, denote successive arrivals of the peddler.

Figure 4. Consumers' Demand for Purchased Goods as a Function of the Peddler's Arrival Time.

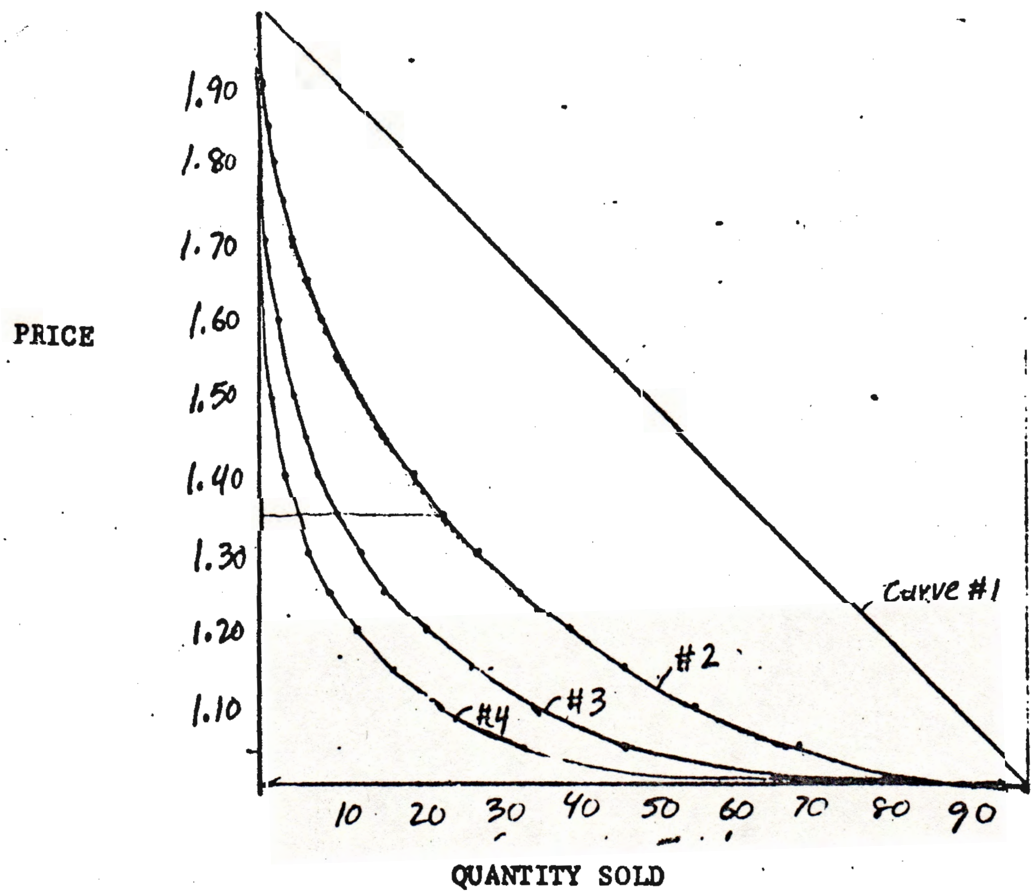


Figure 5. Demand Curves in Pedlar.

Notes

1. The peddler's managerial problem in the short run of the individual trip is to use his factors of production as well as he can to produce his income. The main fixed capital input is his investment in mules, and his problem is use his mules as best as he can without overloading or underloading them. In the longer run of the annual cycle of trips, the main fixed factor is the peddler's knowledge of particular routes or people and places in the selling region. Since the total demand and its periodicity are given for any route, the peddler must adjust his per-trip quantity of merchandise, and therefore his mules, to fulfill the demand in his area.

2. The juggler method was suggested by Sherif El-Hakim (n.d.).

3. The sequence of events is the same in the case of growing children. New clothes of any size are not purchased until the old clothes are so small as to be unwearable.

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TABLE 1. SIMULATION OF SALES PER DAY. AVERAGE OF 1000 EXAMPLES.

	Average[1]	
Sales	Markup	Demand Curve
17.57 (11.69)	35.46 (2.85)	2.8 (.8)

1. Figures in parentheses are standard deviations (SD).

TABLE 2. RELATION BETWEEN DEMAND CURVE AND SELLING DAY.

Demand Curve (z=)	3	2	2.5	3	3.5	(1 + .5 (Selling Day))
Selling Day	1	2	3	4	5	. . .