Hint: Create three new columns. In the first column, use the MIN function to calculate the minimum distance for the customer in that row. In the second column use the MATCH function to find the position of the minimum distance. In the third column, use the position in the previous column with the INDEX function referencing the row of distribution center names to find the name of the distribution center that should service that customer.

WEB file
FloydsMay

19. Refer to Problem 18. Floyd's Bumpers pays a transportation company to ship its product in full truckloads to its customers. Therefore, the cost for shipping is a function of the distance traveled and a fuel surcharge (also on a per-mile basis). The cost per mile is $2.42, and the fuel surcharge is $0.56 per mile. The file *FloydsMay* contains data for shipments for the month of May (each record is simply the customer zip code for a given truckload shipment) as well as the distance table from the distribution centers to each customer. Use the MATCH and INDEX functions to retrieve the distance traveled for each shipment, and calculate the charge for each shipment. What is the total amount that Floyd's Bumpers spends on these May shipments?

    Hint: The INDEX function may be used with a two-dimensional array: =INDEX(*array*, *row_num*, *column_num*), where *array* is a matrix, *row_num* is the row number, and *column_num* is the column position of the desired element of the matrix.

20. An auto dealership is advertising that a new car with a sticker price of $35,208 is on sale for $25,995 if payment is made in full, or it can be financed at 0 percent interest for 72 months with a monthly payment of $489. Note that 72 payments × $489 per payment = $35,208, which is the sticker price of the car. By allowing you to pay for the car in a series of payments (starting one month from now) rather than $25,995 now, the dealer is effectively loaning you $25,995. If you choose the 0 percent financing option, what is the effective interest rate that the auto dealership is earning on your loan? *Hint:* Discount the payments back to current dollars (see Problem 16 for a discussion of discounting), and use Goal Seek to find the discount rate that makes the net present value of the payments = $25,995.

Case Problem Retirement Plan

Tim is 37 years old and would like to establish a retirement plan. Develop a spreadsheet model that could be used to assist Tim with retirement planning. Your model should include the following input parameters:

Tim's current age = 37 years
Tim's current total retirement savings = $259,000
Annual rate of return on retirement savings = 4 percent
Tim's current annual salary = $145,000
Tim's expected annual percentage increase in salary = 2 percent
Tim's percentage of annual salary contributed to retirement = 6 percent
Tim's expected age of retirement = 65
Tim's expected annual expenses after retirement (current dollars) = $90,000
Rate of return on retirement savings after retirement = 3 percent
Income tax rate postretirement = 15 percent

Assume that Tim's employer contributes 6% of Tim's salary to his retirement fund. Tim can make an additional annual contribution to his retirement fund before taxes (tax free) up to a contribution of $16,000. Assume he contributes $6,000 per year. Also, assume an inflation rate of 2%.

Managerial Report

Your spreadsheet model should provide the accumulated savings at the onset of retirement as well as the age at which funds will be depleted (given assumptions on the input parameters).

As a feature of your spreadsheet model, build a data table to demonstrate the sensitivity of the age at which funds will be depleted to the retirement age and additional pre-tax contributions. Similarly, consider other factors you think might be important.

Develop a report for Tim outlining the factors that will have the greatest impact on his retirement.

FIGURE 11.8 SETTING UP SANOTRONICS SPREADSHEET FOR MULTIPLE SIMULATION TRIALS

	A	B	C	D	E	F
1	**Sanotronics**					
2						
3	**Parameters**					
4	Selling Price per Unit	249				
5	Administrative & Advertising Cost	1000000				
6	Direct Labor Cost per Unit	=VLOOKUP(RAND(), A15:C19,3,TRUE)				
7	Parts Cost per Unit	=F14+(F15-F14)*RAND()				
8	Demand	=NORM.INV(RAND(),F18,F19)				
9						
10	**Model**					
11	Profit	=((B4-B6-B7)*B8)-B5				
12						
13	**Direct Labor Cost**				**Parts Cost (Uniform Distribution)**	
14	**Lower End of Interval**	**Upper End of Interval**	**Cost per Unit**	**Probability**	Lower Bound	80
15	0	=D15+A15	43	0.1	Upper Bound	100
16	=B15	=D16+A16	44	0.2		
17	=B16	=D17+A17	45	0.4	**Demand (Normal Distribution)**	
18	=B17	=D18+A18	46	0.2	Mean	15000
19	=B18	1	47	0.1	Standard Deviation	4500
20						
21	**Simulation Trial**	**Direct Labor Cost Per Unit**	**Parts Cost per Unit**	**Demand**	**Profit**	
22	1	=B6	=B7	=B8	=B11	
23	2					
24	3					
1019	998					
1020	999					
1021	1000					

Data Table
Row input cell: D1
Column input cell:
OK
Cancel

and sample proportion. To compute these statistics for the Sanotronics example, we use the following Excel functions:

Excel versions prior to Excel 2010 do not recognize the STDEV.S function; in these versions of Excel, one can use the function STDEV. The results will be the same.

Cell H22	=AVERAGE(E22:E1021)
Cell H23	=STDEV.S(E22:E1021)
Cell H24	=MIN(E22:E1021)
Cell H25	=MAX(E22:E1021)
Cell H26	=COUNTIF(E22:E1021,"<0")/COUNT(E22:E1021)

Cell H26 computes the ratio of the number of trials whose profit is less than zero over the total number of trials. Note by changing the value of the second argument in the COUNTIF function, the probability that the profit is less than any specified value can be computed in cell H26.

Simulation studies enable an objective estimate of the probability of a loss, which is an important aspect of risk analysis.

As shown in Figure 11.9, we observe a mean profit of $717,663, standard deviation of $521,536, extremes ranging between −$996,547 and $2,253,674, and a 0.078 estimated probability of a loss.

FIGURE 11.9 OUTPUT FROM SANOTRONICS SIMULATION

	A	B	C	D	E	F	G	H	I	J	K
1	**Sanotronics**										
3	**Parameters**										
4	Selling Price per Unit	$249									
5	Administrative & Advertising Cost	$1,000,000									
6	Direct Labor Cost Per Unit	$45									
7	Parts Cost Per Unit	$86.29									
8	Demand	19,976									
9											
10	**Model**										
11	Profit	$1,351,439									
12											
13	**Direct Labor Cost**				**Parts Cost (Uniform Distribution)**						
14	**Lower End of Interval**	**Upper End of Interval**	**Cost per Unit**	**Probability**	Lower Bound	$80					
15	0.0	0.1	$43	0.1	Upper Bound	$100					
16	0.1	0.3	$44	0.2							
17	0.3	0.7	$45	0.4	**Demand (Normal Distribution)**						
18	0.7	0.9	$46	0.2	Mean	15,000					
19	0.9	1.0	$47	0.1	Standard Deviation	4,500					
20											
21	**Simulation Trial**	**Direct Labor Cost Per Unit**	**Parts Cost Per Unit**	**Demand**	**Profit**		**Profit Summary Statistics**				
22	1	$45	$86.29	19,976	$1,351,439		**Mean**	$717,663		**Bin**	**Frequency**
23	2	$45	$81.02	14,910	$833,700		**Standard Deviation**	$521,536		–$1,500,000	0
24	3	$46	$98.15	18,570	$947,064		**Minimum Profit**	–$996,547		–$1,250,000	0
25	4	$45	$92.29	12,561	$403,085		**Maximum Profit**	$2,253,674		–$1,000,000	0
26	5	$47	$88.82	6,844	–$225,345		**P(Profit < $)**	0.078		–$750,000	3
27	6	$45	$95.98	15,337	$656,778					–$500,000	4
28	7	$44	$88.23	18,723	$1,186,276					–$250,000	22
29	8	$47	$96.20	17,589	$861,005					$0	49
30	9	$44	$85.97	19,967	$1,376,760					$250,000	113
31	10	$45	$89.62	14,056	$607,650					$500,000	151
32	11	$45	$85.96	11,204	$322,448					$750,000	188
33	12	$45	$92.06	11,150	$248,172					$1,000,000	193
34	13	$47	$85.34	11,880	$385,901					$1,250,000	122
35	14	$44	$80.05	24,733	$2,090,469					$1,500,000	79
36	15	$46	$92.47	10,933	$208,447					$1,750,000	47
37	16	$45	$81.61	17,453	$1,136,087					$2,000,000	20
38	17	$45	$84.16	13,205	$582,483					$2,250,000	7
39	18	$45	$93.07	15,809	$753,735					$2,500,000	2
40	19	$47	$85.33	9,422	$99,247					$2,750,000	0
41	20	$43	$83.58	13,599	$664,800					$3,000,000	0
42	21	$47	$92.23	17,168	$884,578						0
1021	1,000	$45	$92.87	22,467	$1,496,677