

Technology Assignment-Calculate the Total Annual Cost

In an earlier technology assignment, you identified several details of two different health plans. In this technology assignment, you'll create a worksheet which calculates the total annual cost of medical care as the amount of medical charges you incur increases. We want to create a table which calculates the total cost for several different amounts of medical charges.

	A	B	C	D	E
1		Premier Plan		Basic Plus Plan	
2	Plan Type	PPO		PPO	
3	Primary Care Physician Visits	\$20	no deductible	60%	
4	Other Physician Office Visits	80%		60%	
5	In Network Coinsurance	80%		60%	
6	Prescription Drugs				
7	Generic	\$10	no deductible	\$10	no deductible
8	Preferred Brand	20%	max of \$100 per fill	20%	max of \$100 per fill
9	Non-Preferred Brand	50%	\$20 min to a max of \$150 per fill	50%	\$20 min to a max of \$150 per fill
10	Out of Pocket Maximum				
11	Individual	\$3,000		\$6,000	
12	Family	\$6,000		\$12,000	
13	Annual Deductible				
14	Individual	\$300		\$600	
15	Family	\$600		\$1,200	
16	Lifetime Maximum	\$2,000,000		\$2,000,000	
17	Cost	\$514	per month	\$46	per month

This calculation is complicated by the fact that there are very many variables that can impact your overall annual cost. To simplify this calculation, let's make several assumptions. You may make different assumptions, but check with your instructor before making drastic changes.

- Your total annual cost is the sum of several other costs: primary care physician costs, specialist physician costs, and prescription costs. Since we are assuming a typical year, we'll ignore other major costs such as emergency care, maternity care, ect. since these are not normally incurred.
- There is a distinction between charges and costs. A medical charge is the actual charge of the care as incurred at the point of service. A medical cost is the amount you pay after figuring in any coinsurance or copays.
- Assume that you'll make 2 visits to your primary care physician at a charge of $\$100 + 5F$ per visit, where F is the number of letters in your first name. Assume a single specialist visit at a charge of $\$150 + 10L$ per visit, where L is the number of letters in your last name. In addition, assume you have a single generic prescription that incurs a monthly charge of \$30.
- Find the total annual cost for a Individual or Family Coverage, whichever applies to you.
- The insured will only utilize in-network care.

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For this demonstration, I'll work with data from two plans offered by the Yavapai Combined Trust, the Basic Plus Plan and the Premier Plan. The key details we'll need to compare the plans are summarized in the table below.

	Basic Plus Plan	Premier Plan
Primary Care Physician Visit	60%	\$20 copay per visit, no deductible
Other Physician Visits	60%	80%
Prescription Drugs	30 day supply Generic: \$10, Preferred Brand: 20% to \$1000, Non-preferred Brand: 50% with \$20 minimum and \$150 maximum	
Out of Pocket Maximum	Individual: \$6000 per year Family: \$12,000 per year	Individual: \$3000 per year Family: \$6000 per year
Deductible	Individual: \$600 per year Family: \$1200 per year	Individual: \$300 per year Family: \$600 per year
Monthly Premium	\$46	\$514

The percentages indicate the percentage the plan covers after the deductible is met.

You should use the details you have already collected on two health plans in an earlier technical assignment for the Excel worksheet you submit. This example shown in this handout is for illustrative purposes only.

Calculate the Total Annual Cost for Total Charges Less Than the Deductible

1. In Excel, open the file you created to compare the details of the two health plans.
2. At the bottom of the Excel window, you'll see a tab labeled Sheet 2. If there are no other tabs other than the one labeled Initial Information, select the tab labeled  to create a new worksheet.
3. Double click the tab and rename the worksheet Basic Plus Plan.



4. In cell A1, put the name of your Health Plan. In the example below, the name of the plan is Basic Plus Plan. Your health plan will have a different name and associated costs. You may need to resize the columns or rows and wrap text to fit the name in cell A1.

	A	
1	Basic Plus Plan	
2		

5. Now let's put in the column labels in the worksheet for the different medical charges and costs. In row 3, put the following labels:
 - In A3 put Total Medical Charges. This corresponds to the amount the primary care physician charges for the two office visits plus any other medical charges. For the Basic Plus Plan, the insured pays 40% of all charges after the deductible (family deductible is \$1200) has been met.
 - In B3 put Prescription Charges. This corresponds to the amount charged for prescriptions.
 - In C3 put Total Medical Cost. This corresponds to the actual cost incurred by the insured for the medical charges.
 - In D3 put Prescription Costs. These labels correspond to what you actually pay for prescriptions.
 - In E3 put Total Out of Pocket. This label corresponds to the total amount you will pay from your pocket for all medical charges.
 - In F3 put Premium Cost. This is the annual amount you'll pay for the health plan's premiums.
 - In G3 put Total Cost. This is the total annual cost of the plan to you including premiums.

	A	B	C	D	E	F	G
1	Basic Plus Plan						
2							
3	Total Medical Charges	Prescription Charges	Total Medical Cost	Prescription Cost	Total Out of Pocket	Premium Cost	Total Cost

6. Now let's calculate the total annual costs for a particular amount of medical charges. Suppose the only medical charges you incur are the ones assumed above: 2 primary care physician visits and 1 specialist visits. For this example only, I'll assume the primary care physician visits are \$100 per visit for a total of \$200 and specialist visits are \$150 per visit for a total of \$150. In cells A4 put the total medical charges by clicking in the cell and typing = 2*100+150. The formula will also be placed in the formula bar at the top of the worksheet. By using an = in front of the formula, you are indicating that this cell contains a calculation. Press Enter on the keyboard to carry out the calculation.

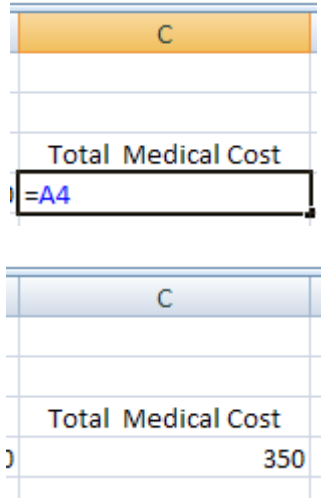
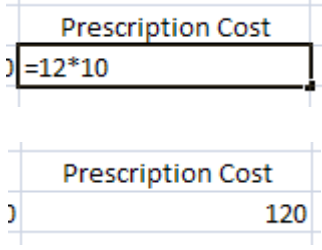
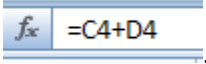
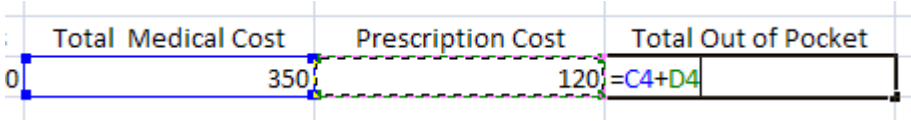
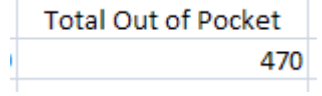
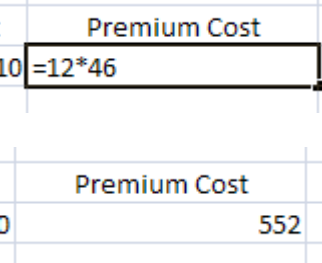
NORMDIST		=2*100+150	
	A	B	
1	Basic Plus Plan		
2			
3	Total Medical Charges	Prescription Charges	
4	=2*100+150		

	A	
1	Basic Plus Plan	
2		
3	Total Medical Charges	P
4		350
5		

7. The monthly charge of the single generic prescription is \$30 so the total annual charge for prescriptions is 12 x \$30 or \$360. Click your mouse in cell B4 to select it. Now type = 12*30. Notice that this formula appears in the function bar at the top of the page. Using an = indicates to Excel that you want it to work out this arithmetic. Press Enter to carry out the calculation.

=12*30	
	B
5	Prescription Charges
50	=12*30

	B
5	Prescription Charges
50	360

<p>8. For the Basic Plus Plan (not for all plans), there is no deductible for prescriptions and each generic prescription costs the insured \$10. Without the prescription charges, the total charges is \$200 + \$150 Or \$350. I am assuming family coverage with a \$1200 deductible so the deductible has not been met. In this situation, the insured is responsible for all non-prescription charges or \$350. This is exactly the amount in cell A4. Click in cell C4 and type = A4 to indicate that the Total Medical Cost is the same as the Total Medical Charges. Instead of typing A4, you could also click on the cell A4. Press Enter.</p>	
<p>9. Even though the prescription charge is \$360 annually, the Basic Plus Plan pays for part of this prescription charge resulting in a monthly cost of \$10 for the generic prescription. To calculate the annual cost for this prescription, click in cell D4 and type = 12*10. Press Enter to calculate this amount.</p>	
<p>10. In cell E4, we want to add the entries in cells C4 and D4 to get the total amount you'll pay out of pocket. Click the cursor in cell E4 to select it and type = C4 + D4. On the function bar you'll see</p>   <p>As a shortcut, you can click on the cells in the sheet instead of typing the location of the cell.</p>	
<p>11. Press Enter to see this sum.</p>	
<p>12. For the Basic Plus Plan, family coverage costs \$46 per month. In cell F4 type = 12*46 to calculate the annual cost of premiums.</p> <p>13. Press Enter to calculate the total cost of premiums.</p>	

14. To complete the first row of charges and costs, click on the cell G4 and type = E4 + F4 and then press Enter.

Total Out of Pocket	Premium Cost	Total Cost
470	552	=E4+F4

This gives total annual costs of \$1022.

15. Now let's increase the Total Medical Charges while keeping all other charges fixed. Increase the Total Medical Charges a small amount like \$250 more for individuals and \$500 more for families. For Family coverage under the Basic Plus Plan, let's increase the Total Medical Charges to \$850. Now the charges are like the ones shown below.

Total Medical Charges
350
=2*100+150+500

You can change the formula like shown above, or simply type 850 into A5. The idea behind increasing the Total Medical Charges is to do it in a systematic way, but not by enough to make the Total Medical Charges exceed the deductible (in this case \$1200). Since the prescription charges are fixed, we duplicate the number in A4 in cell A5

	Total Medical Charges	Prescription Charges
3		
4	350	360
5	850	360

16. The costs are calculated as before giving the entries in cells C5 and D5.

Total Medical Cost	Prescription Cost
350	120
850	120

17. The process for calculating the entries in cells E5 through G5 is exactly the same as the process we used for cells E4 through G4. To duplicate this process in row 5, we can utilize a Fill. Fills are used to apply a calculation to adjacent cells using the entries in the adjacent cells. To start the fill, click on cell E4 to select it.

18. While holding the left mouse button down, drag the cursor to cell G4. The cells will be selected as shown below.

Total Out of Pocket	Premium Cost	Total Cost
470	552	1022

Move the cursor to the small box in the lower right hand corner of the selection. This box is called the fill handle.

19. When the cursor is hovering over the fill handle, it changes from a cross to a +. Click on the left mouse button. While holding the mouse button, drag the cursor to cell G5.

Total Out of Pocket	Premium Cost	Total Cost
470	552	1022

You'll see the selection size increase meaning the formulas in E4 through G4 will be used in cells E5 through G5, but with the entries in row 5.

20. Release the mouse button to complete the fill.

Total Out of Pocket	Premium Cost	Total Cost
470	552	1022
970	552	1522

As expected, increasing the Total Medical Charges by \$500 increases the total out of pocket and total cost increases by \$500 since the deductible has not been met.

21. If the Total Medical Charges increases to \$1200, the family deductible for the Basic Plus Plan is met. Any more charges and the plan kicks in covering 60% of any additional charges. Increase the Total Medical Charges to \$1200 to reach this point. Place these values in row 6 and complete the entries in the rest of the row using fills to calculate the entries in E6 through G6. You can select E4 though G4 again, but this time drag the Fill handle to G6.

3	Total Medical Charges	Prescription Charges
4	350	360
5	850	360
6	1200	360

	Total Medical Cost	Prescription Cost
)	350	120
)	850	120
)	1200	120

	Total Out of Pocket	Premium Cost	Total Cost
)	470	552	1022
)	970	552	1522
)	1320	552	1872

Calculate the Total Annual Cost After the Deductible Is Met

1. In row 6, the Total Medical Charges were equal to the plan's deductible. Now we'll continue to increase the Total Medical Charges by large increments. We'll need to modify how the costs are calculated since the plan pays for 60% of the charges in the Basic Plus Plan once the deductible has been met. A Basic Plan Plus member is responsible for the other 40% of the charges. For your plan, the amount of coinsurance might be different. Increase the other medical charges by a large increment like \$3000. For the Basic Plus Plan, we would have a new entry in A7, but the same entries in B7 since the prescription charges are fixed.

3	Total Medical Charges	Prescription Charges
4	350	360
5	850	360
6	1200	360
7	4200	360

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- Now we need to calculate the Total Medical Cost in C7. For the Basic Plus Plan, you must pay the deductible plus 40% of any amount greater than the deductible. This is done by clicking in C7 and typing $=1200 + 0.4*(A7-1200)$.

	Total Medical Cost
0	350
0	850
0	1200
0	$=1200+0.4*(A7-1200)$

The quantity in parentheses, $A7 - 1200$, gives the amount of Total Medical Charges over \$1200. Multiplying by 0.4 gives us 40% of that amount. Adding 1200 to this amount adds the deductible that needs to be paid.

- Press Enter to carry out the calculation.

- The entries in cells D7 through G7 are carried out the same way the entries in the rows above it.

	Total Medical Charges	Prescription Charges	Total Medical Cost	Prescription Cost	Total Out of Pocket	Premium Cost	Total Cost
4	350	360	350	120	470	552	1022
5	850	360	850	120	970	552	1522
6	1200	360	1200	120	1320	552	1872
7	4200	360	2400	120	2520	552	3072

- Continue increasing the Total Medical Charges by increments of \$3000. In cell A8, type 7200.
- In cell B8, type the amount of fixed prescription charges, either $=12*30$ or simply 360.
- The Total Medical Cost is calculated the same way as in cell A7.

7	4200	360	2400
8	7200	360	$=1200+0.4*(A8-1200)$
9			

- Complete the entries in the rest of the row 8 using fills to calculate the entries in E8 through G8. You can select E4 though G4 again, but this time drag the Fill handle to G8.

	Total Medical Charges	Prescription Charges	Total Medical Cost	Prescription Cost	Total Out of Pocket	Premium Cost	Total Cost
4	350	360	350	120	470	552	1022
5	850	360	850	120	970	552	1522
6	1200	360	1200	120	1320	552	1872
7	4200	360	2400	120	2520	552	3072
8	7200	360	3600	120	3720	552	4272

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9. If we have entered the last two rows correctly and established a pattern in rows 7 and 8, we can select those rows and use the Fill handle to create more rows with greater amounts of Total Medical Charges. Click in cell A7.
10. While holding the left mouse button down, drag the cursor to cell G8. This will select the entries you have made in rows 7 and 8.

	Total Medical Charges	Prescription Charges	Total Medical Cost	Prescription Cost	Total Out of Pocket	Premium Cost	Total Cost
4	350	360	350	120	470	552	1022
5	850	360	850	120	970	552	1522
6	1200	360	1200	120	1320	552	1872
7	4200	360	2400	120	2520	552	3072
8	7200	360	3600	120	3720	552	4272
9							

11. Grab the Fill handle in the lower right hand corner of the selection. Hold the left mouse button down and drag the mouse button down. As you drag lower in column G, you'll see increasing numbers next to the cursor. This tells you how far you are increasing the Total Medical Charges in column A.

12.

6	1200	360	1200	120	1320	552	1872
7	4200	360	2400	120	2520	552	3072
8	7200	360	3600	120	3720	552	4272
9							
10							
11							
12							
13							
14							
15							
16							31200

13. Once you have reached over \$30,000, release the mouse button to see the cells in the table filled.

7	4200	360	2400	120	2520	552	3072
8	7200	360	3600	120	3720	552	4272
9	10200	360	4800	120	4920	552	5472
10	13200	360	6000	120	6120	552	6672
11	16200	360	7200	120	7320	552	7872
12	19200	360	8400	120	8520	552	9072
13	22200	360	9600	120	9720	552	10272
14	25200	360	10800	120	10920	552	11472
15	28200	360	12000	120	12120	552	12672
16	31200	360	13200	120	13320	552	13872

14. Examine the table closely. In this table, in row 15 the Total Out of Pocket exceeds \$12,000. For the Basic Plus Plan, the plan covers the entire medical charge once the Total Out of Pocket reaches \$12,000. Your plan will have a different amount.

	Total Medical Charges	Prescription Charges	Total Medical Cost	Prescription Cost	Total Out of Pocket	Premium Cost	Total Cost
3							
4	350	360	350	120	470	552	1022
5	850	360	850	120	970	552	1522
6	1200	360	1200	120	1320	552	1872
7	4200	360	2400	120	2520	552	3072
8	7200	360	3600	120	3720	552	4272
9	10200	360	4800	120	4920	552	5472
10	13200	360	6000	120	6120	552	6672
11	16200	360	7200	120	7320	552	7872
12	19200	360	8400	120	8520	552	9072
13	22200	360	9600	120	9720	552	10272
14	25200	360	10800	120	10920	552	11472
15	28200	360	12000	120	12120	552	12672
16	31200	360	13200	120	13320	552	13872

We need to determine the amount of Total Medical Charges that results in a Total Out of Pocket of \$12,000 exactly. We could vary the amount in A15 until the E15 is 12,000, but it is more efficient to calculate that amount directly. The amount on E15 is the sum of the Total Medical Cost, $1200 + 0.4 \cdot (A15 - 1200)$ and the Prescription Cost, 120. Replacing the cell name with x , we can write the Total Out of Pocket as $1200 + 0.4(x - 1200) + 120$. Set this amount equal to 12,000 to find when the Total Out of Pocket is equal to \$12,000:

$$1200 + 0.4(x - 1200) + 120 = 12,000$$

To solve this equation, remove the parentheses and combine like terms to yield

$$0.4x + 840 = 12,000$$

Subtract 840 from both sides of the equation and divide by 0.4 to give $x = 27,900$.

This means that Total Medical Charges of \$27,900 leads to Total Out of Pocket of \$12,000.

15. Change the entry in A15 to this new value for Total Medical Charges (your amount will be different). If you have done the calculation correctly, the Total Out of Pocket in E15 will be equal the Maximum Out of Pocket (in this case \$12,000).

14	25200	360	10800	120	10920	552	11472
15	27900	360	11880	120	12000	552	12552
16	31200	360	13200	120	13320	552	13872


16. For any greater amount of Total Medical Charge, such as those in row 16, the Total Out of Pocket will be equal to the Maximum Out of Pocket. This is easily accomplished by changing every entry in column E after row 15 to 12,000. In this case, simply click in E16 and type 12,000. If you have any more rows, change the entries to 12,000 in column E.

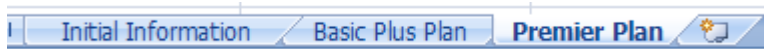
14	25200	360	10800	120	10920	552	11472
15	27900	360	11880	120	12000	552	12552
16	31200	360	13200	120	12000	552	12552

The table you have just created shows how the Total Cost of the plan changes as the amount of annual Total Medical Charges increases. There are three different areas we have focused on, how the cost changes until the deductible has been met (rows 4 through 6), how the cost changes after the deductible has been met until the Maximum Out of Pocket has been achieved (rows 7 through 15), and how the cost changes after the Maximum Out of Pocket has been achieved (row 16).

17. Save your worksheet.

Calculate the Total Annual Cost for the Second Plan

- We'll follow the exact same process to create worksheet for the Premier Plan. Add another worksheet to the Excel file you have been working in using the  tab at the bottom of the Excel window.
- Double click on the name of this new worksheet and rename it Premier Plan.



- As before, we'll start with Total Medical Charges of \$350 (2 primary care physician visits and 1 other physician visit). The prescription charge for one \$30 monthly generic prescription is \$360. This is no difference in the charges between the plan. However, the Total Medical Cost is different since each primary care physician visit costs \$20 with no deductible. This is added to the other physician visits. Since only \$150 of the \$600 family deductible has been met, the insured is responsible for the entire \$150.

	A	B	C
1	Premier Plan		
2	Total Medical Charges	Prescription Charges	Total Medical Cost
3	350	360	=2*20+150

18. The entries in the rest of the row are found exactly like the Basic Plus Plan except the Premium Cost in F3 is = 12*514.

D	E	F	G
Prescription Cost	Total Out of Pocket	Premium Cost	Total Cost
120	310	6168	6478

19. Now increase the total medical charges by \$150 to \$500. This increment is smaller than the initial increment used for the Basic Plus Plan since the deductible for the family Premier Plan is lower, \$600. The two primary care physician visits account for \$200 of these medical changes. These visits cost 2*20 dollars. The other \$300 count toward the deductible, but the deductible has not been met. So the Total Medical Cost in C4 is = 2*20 + 300.

1	Premier Plan		
2	Total Medical Charges	Prescription Charges	Total Medical Cost
3	350	360	190
4	500	360	=2*20+300

The rest of the row is calculated the same as row 3.

20. For the next row, we need to determine when the deductible has been met. This occurs when the medical charges other than the primary care physician charges amount to \$600 (remember that there is no deductible for primary care physician visits). When the Total Medical Charges are \$800, \$600 of those charges must be other than the primary care physician charges and the deductible has been met.

	A	B	C
1	Premier Plan		
2	Total Medical Charges	Prescription Charges	Total Medical Cost
3	350	360	190
4	500	360	340
5	800	360	=2*20+600

Fill out the rest of the row as you did earlier rows.

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21. Once the deductible of \$600 has been met in row 5, we can increase the total medical costs by larger increments. Try Total Medical Charges of \$2000 in cell A6. We can then calculate the Total Medical Cost in C6 using

$$=600+2*20+0.2*(A6-200-600)$$

Let's look at this closely. The first term, 600, corresponds to the deductible and the second term, 2*20, corresponds to the two office visits to the primary care physician. The last term, 0.2*(A6 – 200 – 600), is the 20% of the Total Medical Charges (after subtracting the primary care physician visit charges and deductible) the insured is responsible for under the Premier Plan. The rest of the row is filled out as the other rows have been filled out.

22. In row 7, increase the Total Medical Charges to \$5000. After completing this row, you should have something like the rows below.

6	2000	360	880	120	1000	6168	7168
7	5000	360	1480	120	1600	6168	7768

23. Select the last two rows you created, rows 6 and 7.

24. Grab the Fill handle and drag it until the Total Medical Charges extend to a large number like 32,000 or more.

	A	B	C	D	E	F	G
1	Premier Plan						
2	Total Medical Charges	Prescription Charges	Total Medical Cost	Prescription Cost	Total Out of Pocket	Premium Cost	Total Cost
3	350	360	190	120	310	6168	6478
4	500	360	340	120	460	6168	6628
5	800	360	640	120	760	6168	6928
6	2000	360	880	120	1000	6168	7168
7	5000	360	1480	120	1600	6168	7768
8	8000	360	2080	120	2200	6168	8368
9	11000	360	2680	120	2800	6168	8968
10	14000	360	3280	120	3400	6168	9568
11	17000	360	3880	120	4000	6168	10168
12	20000	360	4480	120	4600	6168	10768
13	23000	360	5080	120	5200	6168	11368
14	26000	360	5680	120	5800	6168	11968
15	29000	360	6280	120	6400	6168	12568
16	32000	360	6880	120	7000	6168	13168

Notice that in row 15, the Total Out of Pocket has exceeded the Maximum Out of Pocket allowed by the Premier Plan.

25. We need to adjust the entry in column A, the Total Medical Charges, so that the Total Out of Pocket is exactly \$6000. The Total Out of Pocket is the sum of the Prescription Cost, 120, and the Total Medical Cost, = $600 + 2 \cdot 20 + 0.2 \cdot (A15 - 200 - 600)$. If we replace cell A15 with the variable x we can find when the Total Out of Pocket is equal to 6000 by solving

$$600 + 2 \cdot 20 + 0.2(x - 200 - 600) + 120 = 6000$$

Simplify the left side of the equation to yield

$$0.2x + 600 = 6000$$

Subtract 600 from both sides and divide by 0.2 to yield $x = 27000$. Locate the row in where the Total Out of Pocket exceeds \$6000 and change the Total Medical Charge to \$27,000. Once you make this change and press Enter, the corresponding Total Out of Pocket should change to \$6000.

14	26000	360	5680	120	5800	6168	11968
15	27000	360	5880	120	6000	6168	12168
16	32000	360	6880	120	7000	6168	13168

Total Medical Charges of \$27,000 leads to a Total Out of Pocket of \$6000

26. Once the Total Out of Pocket has reached the Maximum Out of Pocket for the Premier Plan, increasing the Total Medical Charges should not change the Total Out of Pocket. For all rows below the point at which the Maximum Out of Pocket is reached, change the Total Out of Pocket to the Maximum Out of Pocket. This means that any entry in column E below row 15 should be \$6000.

13	23000	360	5080	120	5200	6168	11368
14	26000	360	5680	120	5800	6168	11968
15	27000	360	5880	120	6000	6168	12168
16	32000	360	6880	120	6000	6168	12168

27. Now that we have a table of values for each plan, save your Excel worksheet. A worksheet like this one is what you will turn in for the tech assignment. Make sure that you use the two health plans you found in an earlier tech assignment and that your worksheet includes the Initial Information on the health plans. This Excel file is what you will submit for this technology assignment.