

# Excel Assignment 11

## Buying Your Dream House

<b>Due:</b>	<b>Thursday, March 10 01, 02</b>
<b>Time due:</b>	<b>Class (first 5 minutes)</b>
<b>Media:</b>	<b>Hand in a hard copy (paper) Excel or Word documents (pasted Excel or screen capture – readable with gridlines)</b>
<b>Purpose:</b>	<b>To ensure you gain the knowledge to use a spreadsheet to perform the operations needed to calculate mortgage payments, interest rates and the necessary formulas and functions for these calculations. To make useful assumptions to determine a large purchase</b>
<b>Points:</b>	<b>70 (4 parts)</b>

**READ ALL THE INSTRUCTIONS FIRST BEFORE YOU BEGIN.**

**\*\*\* Make a documentation page. \*\*\***

### (1) The “Buy Now” Plan

You can buy your dream house now for \$139,500.00 at 9.5% APR on a 30 year mortgage.

#### Sheet 1 (label it “Buy Now”)

The mortgage payment is done on a monthly basis using a **guess** like \$1,500.00 for a monthly payment (since you must determine what the monthly payment will be to pay the mortgage in the 360-month period. **Remember APR is Annual Percentage Rate, so you must divide by 12 to get the monthly interest rate.** And don't confuse interest rate (%) with interest amount (\$)!!!

Use the “What if ...” technique to determine what the monthly payment will actually be for the mortgage (try various values for the monthly payment, and let the spreadsheet recalculate, until you have a close answer- to the penny in your payment, not fractions of a penny).

**Detail:** in separate cells at the top of your Excel sheet put the payment label and payment amount. See the Detail below under Method for the interest. The same holds true for parameters that should be outside of the table that calculates the data.

**If you tried the above technique and realize how much of a pain it is, you should know that there is a much easier way to do this. The way is to use “Goal Seek” in the Tools menu. You want your Balance in the 360th month (G365 on sample) to be 0 by changing the payment amount at the top (G2). Make sure the cursor is in the proper part of the menu and then click the cell you want as an address. See help if you need more help or your text.**

Calculate how much interest you will pay over the entire loan (see example).

**NOTE:** remember to use a split screen (**Split Box – look it up in help**) so you don't have to jump back and forth to see the beginning and end of the sheet.

## (2) The “Buy Later” Savings Plan

With the above information, you begin to ask yourself whether there may be a better way (less expensive) to acquire this new house. You decide to investigate another option:

You will save money for **4 years**, and then buy your dream house, using the savings as a down payment (to reduce the cost).

### Sheet 2 (label it “Savings”)

You will **deposit the mortgage payment** amount (your actual payment per month) from the “buy now” plan (**less your \$350.00/mo rent**) into a savings account. You will do this for **every month** for **4 years**, where it will grow at a safe **6.25% APR**. The savings amount each month is the payment you determined in the buy now plan minus your rent of \$350.00. The account starts with your first deposit.

Determine how much is accumulated (deposit each month plus interest earned) in the 4 years (see example).

## Buying the House

### Sheet 3 (label it “Buy later **with** down”)

Your dream house will cost \$142,500.00 at the end of your “saving” period (assuming 2% annual inflation in the cost of materials during those 4 years when you were saving). You get a 30 year mortgage at 9.75% APR. **Assuming the same monthly payment** as the “**buy now**” plan, determine when the house is paid off (i.e., the month of the final payment). You **add** the down payment to the first monthly payment (your savings **plus** your first monthly payment).

Calculate the total interest you will pay with this method.

**Note:** the house is paid off with the last payment that pays the remaining debt, even if it over pays it some (an amount less than a monthly payment).

### Sheet 4 (label it “Buy later **without** down”)

Determine the length of time (which month it is paid off) it will take to pay off the buy later mortgage using the same monthly payment as the “**buy now**” plan but without a down payment. In other words, determine how many months it takes to pay off the “**Buy later plan**” with only the payment used from the “**buy now**” plan using the new interest amount and purchase price. See example.

Calculate the total interest you will pay with this method.

### Method

You are, of course, using the spreadsheet to do your calculations, by making a month-by-month table like the one used in class to demonstrate a mortgage repayment table (where the balance at the end of one month becomes the balance at the beginning of the next month, and you copy and paste the formulas contained in the second row as many times as necessary to make the table).

**Note:** drag just a few (4 or 5) rows down the sheet and check the results for errors. Make sure you have formulas in each cell of the row and “\$” (Absolute or mixed addressing) where needed.

**The spreadsheet should be designed so the parameters (like initial balance (purchase price), payment, and interest rate) are in their own cells outside the table, and referenced into the table where needed (usually in the first row).**

**Detail:** what you have to be careful of is not to merge cells together to get the look I have in my examples. To make the cells look like a banner, place the label in one cell and the amount in another along side of it –

	Interest APR	10.50%	

At this point the cell with the percent in it can be changed as a percentage and referenced from other cells in a spreadsheet. If the cells were merged, a reference to it would yield an error because it would not be percentage alone, it would contain text also.

The next step is to add a background color to make it look like a banner label (one label) –

	Interest APR	10.5%	

**Note:** when you print your work in Word the grid lines will not show up unless you format the cells with borders. **Do so.** The borders will show in the banner labels but don’t worry about it, it’s ok.

By having each line dependent on something in the previous line, you are using recalculation to create a sequence. The value in doing it that way is that when you change the value in a cell, everything after that will be recalculated. In particular, changing a parameter (such as interest rate or initial balance) will cause the whole table to be automatically updated according to the new value for that parameter. The number of months (i.e., the number of repetitions) can be changed by deleting or pasting lines in the table.

Note the similarities between the formulas in the mortgage table and the savings table.

## Report Results

Using MS Word, make a neat, clear, well-organized document as follows:

Make headers and footers for each page. **Last name first** on the left side, CS 172-xx on the right side, date on the left side under name, assignment number on the right side under class and auto page number in the footer.

Make a **Documentation page** called “Buy Now or Buy Later?” on a separate page. **5 pts**

Copy the first 15 lines of the sheets (enough to take in at least 4 lines of your monthly payments at the beginning and 4 lines at the end – use the page divider (split box) just above the top side scroll button – pull it down) and paste them into the report **and** also paste the same group of lines **again as formulas** so I can check your work (there should be 3 mortgage and 1 savings table). **With the formula view you should have 8 pasted items, 2 or 3 a page.**

Make a small **line graph** (chapter 4) of just the **Interest paid** for the “Buy now” plan and paste it after the Excel sheets (highlight the label **Interest paid** and the rest of the column and then make a chart).

## Answer the following questions at the end of the report:

1. What is your monthly payment under the “buy now” plan (**sheet 1**)? It should be between \$1160.00 and \$1165.00.
2. How much interest will you pay over the life of the loan (**sheet 1**)? It should be between \$279,400.00 and \$279,500.00
3. How much accumulated in the savings account in 4 years (**total saved, sheet 2**)? It should be between \$44,400.00 and \$44,500.00.
4. When is the house paid off (the number of months) in the **buy-later plan**, using the same monthly payments as the **buy-now plan, with the down** payment (**sheet 3**)? Look at the month numbers **not header numbers** of the spreadsheet. It should be between 139 and 143 (under Month).
5. When is the house paid off (the number of months) in the **buy-later plan**, using the same monthly payments as the **buy-now plan “without the down”** (**sheet 4**)? It is over 500.
6. How much interest will you pay over the life of the “buy later plan” loan, using the “**with down**” method (**sheet 3**)? It should be between \$65,200.00 and 65,400.00.
7. How much interest will you pay over the life of the “buy later plan” loan, using the “**without down**” method (**sheet 4**)? It should be between \$479,000.00 and \$481,000.00.
8. What is the smallest monthly payment for the buy-later plan to pay off the loan in 30 years without the down payment (**recalculate sheet 3 without the down**)

- payment for a 30 year period or redo sheet 4 for a 30 year period)? It should be between \$1,213.00 and \$1,216.00
- How much interest will you pay over the life of the loan of question 8 (sheet 3 recalculated without the down for 30 years or redo sheet 4 for a 30 year period)? It should be between \$294,670.00 and \$294,710.00.
  - Which buying strategy requires you to pay the **least interest** over the period of the loan?
  - Do you see the benefit of paying off a credit card as fast as possible rather than just the monthly minimums? This is just a yes or no answer of which either is correct.

**Sample Assignment:**

**Buy now plan**

Doe, John CS 172-XX 3/16/03	<b>Purchase Price</b>	<b>\$139,500.00</b>	<b>Payment period</b>	<b>360 Months</b>
	<b>Interest APR</b>	<b>10.00%</b>	<b>Payment</b>	<b>\$ 1,214.10</b>

Month	Principal	Payment	Interest Rate	Interest Amount Paid	Principal Paid	Balance
1	\$139,500.00	\$ 1,214.10	0.83%	\$ -	\$1,214.10	\$138,285.90
2	\$138,285.90	\$ 1,214.10	0.83%	\$ 1,152.38	\$ 61.72	\$138,224.18
3	\$138,224.18	\$ 1,214.10	0.83%	\$ 1,151.87	\$ 62.23	\$138,161.95
4	\$138,161.95	\$ 1,214.10	0.83%	\$ 1,151.35	\$ 62.75	\$138,099.20
358	\$ 3,571.15	\$ 1,214.10	0.83%	\$ 29.76	\$1,184.34	\$ 2,386.80
359	\$ 2,386.80	\$ 1,214.10	0.83%	\$ 19.89	\$1,194.21	\$ 1,192.59
360	\$ 1,192.59	\$ 1,214.10	0.83%	\$ 9.94	\$1,204.16	\$ (11.57)
<b>Total</b>				<b>\$297,564.43</b>		

Doe, John	<b>Purchase Price</b>	<b>139500</b>	<b>Payment period</b>	<b>360 Months</b>
	<b>Interest APR</b>	<b>0.1</b>	<b>Payment</b>	<b>1214.1</b>

CS 172-XX  
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Month	Principal	Payment	Interest Rate	Interest Amount Paid	Principal Paid	Balance
1	=D1	=\$G\$2	=\$D\$2/12	0	=C6 - E6	=B6 - F6
2	=G6	=\$G\$2	=\$D\$2/12	=B7*D7	=C7 - E7	=B7 - F7
3	=G7	=\$G\$2	=\$D\$2/12	=B8*D8	=C8 - E8	=B8 - F8

358 =G362 =\$G\$2 =\$D\$2/12 =B363\*D363 =C363 - E363 =B363 - F363  
 359 =G363 =\$G\$2 =\$D\$2/12 =B364\*D364 =C364 - E364 =B364 - F364  
 360 =G364 =\$G\$2 =\$D\$2/12 =B365\*D365 =C365 - E365 =B365 - F365  
**Total** =SUM(E6:E365)

**Savings**

Doe, John	<b>Payment Amount</b> \$ 1,214.10	<b>Rent Amount</b> 350
CS 172-02	<b>Interest</b> 6.25%	<b>Savings Period</b> 48 Months
Oct. 17, 02		

Months	Beginning of month balance	Interest Rate	Deposit	Interest Amount Earned	End of month balance
1	\$ -	0.52%	\$ 864.10	\$ 4.50	\$ 868.60
2	\$ 868.60	0.52%	\$ 864.10	\$ 9.02	\$ 1,741.73
3	\$ 1,741.73	0.52%	\$ 864.10	\$ 13.57	\$ 2,619.40
4	\$ 2,619.40	0.52%	\$ 864.10	\$ 18.14	\$ 3,501.64
46	\$43,919.19	0.52%	\$ 864.10	\$ 233.25	\$45,016.53
47	\$45,016.53	0.52%	\$ 864.10	\$ 238.96	\$46,119.60
48	\$46,119.60	0.52%	\$ 864.10	\$ 244.71	<b>\$47,228.40</b>
<b>TOTAL</b>			<b>\$41,476.80</b>	<b>\$5,751.60</b>	

Doe, John	<b>Payment Amount</b> ='Buy Now'!G2	<b>Rent Amount</b> 350
CS 172-02	<b>Interest</b> 0.0625	<b>Savings Period</b> 48 Months
Oct. 17, 02		

Months	Beginning of month balance	Interest Rate	Deposit	Interest Amount Earned	End of month balance
1	0	=D\$2/12	=D\$1-\$G\$1	=C6*(B6+D6)	=B6+D6+E6
2	=F6	=D\$2/12	=D\$1-\$G\$1	=C7*(B7+D7)	=B7+D7+E7
3	=F7	=D\$2/12	=D\$1-\$G\$1	=C8*(B8+D8)	=B8+D8+E8
46	=F50	=D\$2/12	=D\$1-\$G\$1	=C51*(B51+D51)	=B51+D51+E51
47	=F51	=D\$2/12	=D\$1-\$G\$1	=C52*(B52+D52)	=B52+D52+E52
48	=F52	=D\$2/12	=D\$1-\$G\$1	=C53*(B53+D53)	<b>=B53+D53+E53</b>
<b>TOTAL</b>			<b>=SUM(D6:D53)</b>	<b>=SUM(E6:E53)</b>	

### Buy later with down

Doe, John  
CS 172-02  
Oct. 17, 02

<b>Purchase Price</b>	<b>\$142,500.00</b>
<b>Interest APR</b>	<b>10.50%</b>

<b>Payment period</b>	<b>360 Months</b>
<b>Payment</b>	<b>\$ 1,214.10</b>

Month	Principal	Payment	Interest Rate	Interest Amount Paid	Principal Paid	Balance
1	\$ 142,500.00	\$ 48,442.50	0.88%	\$ -	\$48,442.50	\$ 94,057.50
2	\$ 94,057.50	\$ 1,214.10	0.88%	\$ 823.00	\$ 391.10	\$ 93,666.40
3	\$ 93,666.40	\$ 1,214.10	0.88%	\$ 819.58	\$ 394.52	\$ 93,271.88
4	\$ 93,271.88	\$ 1,214.10	0.88%	\$ 816.13	\$ 397.97	\$ 92,873.91
128	\$ 4,785.59	\$ 1,214.10	0.88%	\$ 41.87	\$ 1,172.23	\$ 3,613.36
129	\$ 3,613.36	\$ 1,214.10	0.88%	\$ 31.62	\$ 1,182.48	\$ 2,430.88
130	\$ 2,430.88	\$ 1,214.10	0.88%	\$ 21.27	\$ 1,192.83	\$ 1,238.05
131	\$ 1,238.05	\$ 1,214.10	0.88%	\$ 10.83	\$ 1,203.27	\$ 34.78
132	\$ 34.78	\$ 1,214.10	0.88%	\$ 0.30	\$ 1,213.80	\$ (1,179.01)
133	\$ (1,179.01)	\$ 1,214.10	0.88%	\$ (10.32)	\$ 1,224.42	\$ (2,403.43)
134	\$ (2,403.43)	\$ 1,214.10	0.88%	\$ (21.03)	\$ 1,235.13	\$ (3,638.56)

Interest paid  
\$63,810.59

Doe, John  
CS 172-02  
Oct. 17, 02

<b>Purchase Price</b>	<b>142500</b>
<b>Interest APR</b>	<b>0.105</b>

<b>Payment period</b>	<b>360 Months</b>
<b>Payment</b>	<b>1214.1</b>

Month	Principal	Payment	Interest Rate	Interest Amount Paid	Principal Paid	Balance
1	=D1	=Savings!F53+'Buy later with down'!G2	=D\$2/120		=C6 - E6	=B6 - F6
2	=G6	=\$G\$2	=D\$2/12	=B7*D7	=C7 - E7	=B7 - F7
3	=G7	=\$G\$2	=D\$2/12	=B8*D8	=C8 - E8	=B8 - F8
4	=G8	=\$G\$2	=D\$2/12	=B9*D9	=C9 - E9	=B9 - F9
128	=G132	=\$G\$2	=D\$2/12	=B133*D133	=C133 - E133	=B133 - F133
129	=G133	=\$G\$2	=D\$2/12	=B134*D134	=C134 - E134	=B134 - F134
130	=G134	=\$G\$2	=D\$2/12	=B135*D135	=C135 - E135	=B135 - F135
131	=G135	=\$G\$2	=D\$2/12	=B136*D136	=C136 - E136	=B136 - F136
132	=G136	=\$G\$2	=D\$2/12	=B137*D137	=C137 - E137	=B137 - F137
133	=G137	=\$G\$2	=D\$2/12	=B138*D138	=C138 - E138	=B138 - F138
134	=G138	=\$G\$2	=D\$2/12	=B139*D139	=C139 - E139	=B139 - F139

Interest paid  
=SUM(E6:E137)

**Buy later without down**

Doe, John  
CS 172-02  
Oct. 17, 02

<b>Purchase Price</b>	<b>\$142,500.00</b>
<b>Interest APR</b>	<b>10.30%</b>

<b>Payment period</b>	<b>360 Months</b>
<b>Payment</b>	<b>\$ 1,214.10</b>

Month	Principal	Payment	Interest Rate	Interest Amount Paid	Principal Paid	Balance
1	\$ 142,500.00	\$ 1,214.10	0.86%	\$ -	\$ 1,214.10	\$ 141,285.90
2	\$ 141,285.90	\$ 1,214.10	0.86%	\$ 1,212.70	\$ 1.40	\$ 141,284.50
3	\$ 141,284.50	\$ 1,214.10	0.86%	\$ 1,212.69	\$ 1.41	\$ 141,283.10
4	\$ 141,283.10	\$ 1,214.10	0.86%	\$ 1,212.68	\$ 1.42	\$ 141,281.68
791	\$ 3,461.81	\$ 1,214.10	0.86%	\$ 29.71	\$ 1,184.39	\$ 2,277.42
792	\$ 2,277.42	\$ 1,214.10	0.86%	\$ 19.55	\$ 1,194.55	\$ 1,082.87
793	\$ 1,082.87	\$ 1,214.10	0.86%	\$ 9.29	\$ 1,204.81	\$ (121.94)
<b>66.083333</b>				<b>\$ 820,159.36</b>		

**Years**

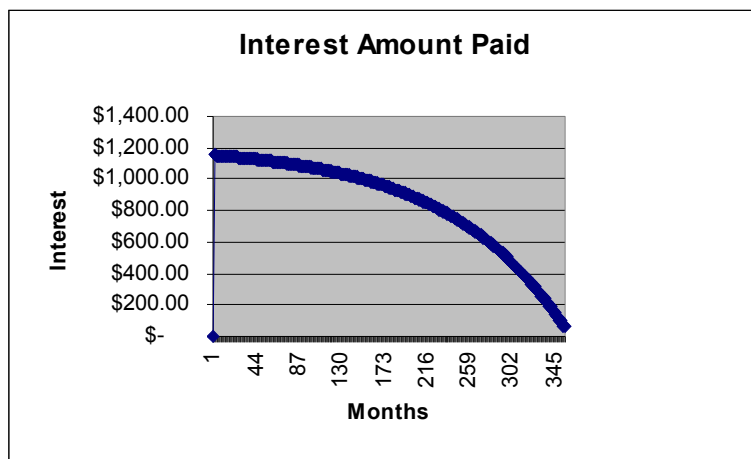
Doe, John  
CS 172-02  
Oct. 17, 02

<b>Purchase Price</b>	<b>142500</b>
<b>Interest APR</b>	<b>0.103</b>

<b>Payment period</b>	<b>360 Months</b>
<b>Payment</b>	<b>1214.1</b>

Month	Principal	Payment	Interest Rate	Interest Amount Paid	Principal Paid	Balance
1	=D\$1	=G\$2	=D\$2/12	0	=C6 - E6	=B6 - F6
2	=G6	=G\$2	=D\$2/12	=B7*D7	=C7 - E7	=B7 - F7
3	=G7	=G\$2	=D\$2/12	=B8*D8	=C8 - E8	=B8 - F8
4	=G8	=G\$2	=D\$2/12	=B9*D9	=C9 - E9	=B9 - F9
791	=G795	=G\$2	=D\$2/12	=B796*D796	=C796 - E796	=B796 - F796
792	=G796	=G\$2	=D\$2/12	=B797*D797	=C797 - E797	=B797 - F797
793	=G797	=G\$2	=D\$2/12	=B798*D798	=C798 - E798	=B798 - F798
<b>=A798/12</b>				<b>=SUM(E6:E798)</b>		

**Chart of the buy now plan**



**And then answer the 11 questions at this point. 20Pts**