Lab 7
Using Financial Functions and Creating a Data Table

**Purpose:** To demonstrate the ability to create a worksheet that utilizes financial functions and contains a data table.

**Problem:** The time has come for you to purchase a home. After years of saving you are ready to find the home of your dreams. You have a down payment and now wish to develop an amortization schedule so you can plan your payments. You hope to borrow no more than $125,000. Interest rates are low but may soon be rising. Because you are not sure how long it will take to find just the right home, you wish to examine several different payment plans. You hope to pay off the loan in 30 years.

Develop a worksheet that will show the monthly payment as well as the beginning balance for each year of the loan, the ending balance for each year of the loan, the annual cost of the loan, and the annual interest paid for each year of the loan.

**Instructions:** With a blank worksheet on the screen, create the worksheet illustrated in this sample file: [http://faculty.lasierra.edu/~dlin/classes/cptg104/labs/lab07/sample.pdf](http://faculty.lasierra.edu/~dlin/classes/cptg104/labs/lab07/sample.pdf)

**Part 1: Perform the following tasks for a 30 year loan:**

1. Select the entire worksheet and change the font size to 12.

2. Change the column widths to the following: A = 9.00; B, C, and E = 15.00; D = 16.43.

3. Change the row heights to the following: 1, 6, 37, and 38 = 39.00.

4. Enter the worksheet title, Home Loan Schedule, in cell A1. Merge and center cell A1 across the range A1:E1. Change the font type to Bookman Old Style, the font color to red, and the background to yellow.

5. Enter the following labels: B2 = Principal; B3 = Rate; B4 = Years; B5 = Payment; D5 = per month; A6 = Year; B6 = Beginning Balance; C6 = Ending Balance; D6 = Total Paid; E6 = Interest. Change the font color for cells B2:B5, and A6:E6 to blue; cells C2:E5 should remain automatic (black).
   - To get "Beginning Balance" and "Ending Balance" on two lines, select cells B6:C6, and do Format | Cell | Alignment | Wrap Text

6. Enter the =Now() function in cell E2 to display the current date. Do Format | Cell | Date, and select the format that looks like the sample.

7. Enter the principal amount of $125,000 in cell C2. Apply the currency format with no decimal places. Do not manually type in the $ sign. Do Format | Cell | Number | Currency.

8. Enter the interest rate of 7.2% in cell C3. Format the cell according to the sample.
9. Enter the number 30 in cell C4 for the number of years.

10. Enter the function =PMT in cell C5 to calculate the monthly payment on a loan of $125,000 (cell C2) at 7.2% (cell C3) for 30 years (cell C4). Format the cell according to the sample.
   - **Rate** is the interest per month, so you need to change the interest to be per month rather than per year.
   - **Nper** is the number of months to pay off the loan. You need to change the years to number of months.
   - **Pv** is the original loan amount.

Always use a reference to the cells containing the three numbers. Do not just type in the numbers.

The function returns a negative number. Red color means that the number is negative. You need to make it into a positive number by putting a negative sign (–) after the = sign, e.g., =–PMT(… Make sure this cell is formatted as currency with two decimal places.

11. Type the number 1 in cell A7 for year 1.

12. Enter the formula =A7+1 in cell A8. Use the fill handle to fill the range A8:A36 with the numbers 2 to 30.

13. Enter the formula =C2 in cell B7 to reference the principal, which is the beginning balance for year 1.
   - A string of # signs mean that the column is not wide enough. Just widen it.

14. Enter the formula =C7 in cell B8 to obtain the beginning balance for year 2. Copy this formula to the range B9:B36. For now, they are all zeros. Do you know why?

15. Enter the =PV function in cell C7 to determine the ending balance for year 1.
   - **Rate** is the interest per month, so you need to change the interest to be per month rather than per year. The annual interest is in cell C3.
   - **Nper** is the remaining **number of months** to pay off the loan. For example, at the end of year 1, the number of months left is 29 [years] *12 [months per year]. Instead of manually typing the number 29, you need to calculate it from the duration of the loan (from cell C4) and the year number in column A. Hint: How do you get the number 29 from cells C4 and A7?
   - **Pmt** is the monthly payment that you calculated in step 10.
   - This step is probably the most difficult!
     - First, try to see if you can get the correct number for year 1 (in cell C7).
     - Now copy the formula from cell C7 to cell C8 for year 2.
     - The resulting number in C8 will be wrong. Look at the formula in cell C8 to see what is wrong. You should be able to see what is wrong when you compare this incorrect formula with the correct formula in cell C7.
As you can see, some cell references should change and some should not. Decide which cell references need to change and which are constants (and therefore should not change). From this, you should be able to deduce where to use absolute cell references (using $ signs). In order to do step 15 correctly, the formula in cell C7 must use the $ signs correctly.

16. Copy the =PV function entered in cell C7 to the range C8:C36. If the equation in cell C7 is correct, then the value in cell C36 should be zero. If it is not, then go back to step 15 to correct the formula in cell C7.

17. Enter the equation to calculate the total annual amount paid in cell D7. Since the monthly payment is in cell C5, you should be able to calculate the annual amount.

18. Enter the equation to calculate the annual interest paid in cell E7. You have calculated the total annual amount paid in D7. Of the total annual amount in D7, a portion goes to reducing the loan amount, which you can calculate by subtracting the Ending Balance from the Beginning Balance. The rest of the amount from D7 is the interest.

19. Copy the formula in cell D7 to the range D8:D36 by dragging the cell handle (bottom right corner of the cell).

20. Copy the formula in cell E7 to the range E8:326.

21. Use the =SUM function in cells D37 and E37 to sum the payment and interest amounts. How much did it cost you to borrow $125,000 under the 30 year mortgage plan?

22. Format all cells as illustrated in the sample.

**Part 2:**
You decide to try to shorten the loan so the house is paid off in 20 years instead of 30, at the same interest rate. When you enter 20 in cell C4, you notice that the Total Paid column continues past the 20 year mark, so the total amount paid is incorrect. In addition, the amount of interest you pay past the 20 year mark is also incorrect. The Total Paid and Interest cells should display a 0 if the amount in the corresponding Ending Balance cell is less than 0, or otherwise calculate these values in steps 17 and 18.

23. Modify the contents of cell D7, using the =IF function to see if C7 is less than 0. If it is less than 0, D7 should display a 0. Otherwise, it performs the calculation in step 17. Drag and fill this formula from D8:D36. Notice that for a 20 year loan, D27:D36 should be 0.

24. Modify the contents of cell E7, using the =IF function to see if C7 is less than 0. If it is less than 0, E7 should display a 0. Otherwise, it performs the calculation in step 18. Drag and fill this formula from E8:E36. Notice that for a 20 year loan, E27:E36 should be 0.

25. Write down on page 2 how much it cost you to borrow $125,000 in the 20 year mortgage plan.
26. In cell A38, enter the label, The Effect of Various Interest Rates. Format this entry the same as the entry in cell A1.

27. Enter the following labels: B39 = Rate; C39 = Total Paid; D39 = Total Interest. Right justify, and set to blue the font color of these cells.

28. Enter the formula =D37 in cell C40 and the formula =E37 in cell D40.

29. Enter and format the interest rates illustrated in the sample into the range B41:B47.

30. Use the Table command in the Data menu to create a one-variable data table that displays the total amount paid and the total amount of interest for the 30 year amortization schedule created in this exercise.
   - Select the range B40:D47. Select Data | Table. Insert the reference C3 in the “Column input cell:”
   - If your table contains the same numbers in all of the entries, then somewhere you have manually typed in a number instead of using a cell reference. Hint: most likely it is the PMT function in cell C5.

31. Rename the Sheet 1 tab to Home Loan by double clicking the Sheet 1 tab at the bottom of the worksheet.

32. Put your name in the footer left justified, and “Page # of #” in the footer right justified.

33. Insert a scatter chart on page two that plots the Rate against the Total Paid and Total Interest as shown in the sample.
   - Select the range B39:D47. Insert chart. Select XY scatter chart.
   - In step 3 of 4, select the Titles tab. Type in the chart title, and the X and Y axis titles.
   - Click Finish.
   - Format the chart to look like the sample. You can right-click on each item and select format. The titles are all Arial 12 bold. The scales and legend are Arial 10. The Y axis numbers are of type Currency, no decimal places, and the X axis numbers are of type Percentage. Also format the data series so the line pattern type is Automatic.

34. Save the workbook.

35. Modify the top and bottom margins so that all the numbers fit on one page in portrait mode, and the chart on the second page.

36. Print the worksheet (2 pages). Write down on page 2 the five equations that appear for year 30 (in cells A36:E36). Do not email to me.