PROJECT 3
MORTGAGES, LOANS AND AMORTIZATION

Sample Computer Screens

Finding Monthly Payements and Interest Totals

Mortgage or Loan Amount	Annual Interest Rate	Mortgage or Loan Term (in years)	Monthly Payment	Total of all Payments	Total Interest Paid
$108,000.00	3.25%	30	$470.02	$169,208.22	$61,208.22
$15,265.00	7.50%	5	$305.88	$18,352.76	$3,087.76
$25,500.00	5.00%	10	$270.47	$32,456.05	$6,956.05
$30,000.00	4.00%	10	$303.74	$36,448.25	$6,448.25

$178,765.00	**Totals**		$1,350.10	$256,465.27	$77,700.27

Finding Loan Amounts for a Fixed Payement

Mortgage or Loan Amount	Annual Interest Rate	Mortgage or Loan Term (in years)	Monthly Payment	Total of all Payments	Total Interest Paid
$17,995.54	6.25%	5	$350.00	$21,000.00	$3,004.46

Mortgage or Loan Amount	Annual Interest Rate	Mortgage or Loan Term (in years)	Monthly Payment	Total of all Payments	Total Interest Paid
$120,000.00	4.00%	30	$572.90	$206,243.41	$86,243.41

Amortization Schedule

Scroll Down to see the Complete Amortization Schedule	Month	Payment Amount	Portion of Payment applied to Interest	Portion of Payment applied to Principal	Outstanding Balance
	0				$120,000.00
	1	$572.90	$400.00	$172.90	$119,827.10
	2	$572.90	$399.42	$173.47	$119,653.63
	3	$572.90	$398.85	$174.05	$119,479.57
	4	$572.90	$398.27	$174.63	$119,304.94

DIRECTIONS:

1. Please read all directions. Study and analyze the computer screen before you start answering the questions. You will find information on the screen necessary to answer most questions.

2. Project 3 contains 2 spreadsheets: the first spreadsheet is titled Payments and Interest, the second is titled Amortization Schedule. Use the file tabs in the lower left corner of the spreadsheet to switch between spreadsheets.

3. Only values in Blue can be changed.

4. When you enter numeric data, do not include the $ or the , in the number. For example, to enter $1,765.56 you should enter 1765.56. To enter a percentage you must enter the value in decimal form. To enter an interest rate of 5% you must type .05.

5. Reset the original values for Project 3 from the sample screens above.

6. To print a copy of the spreadsheet select the print icon from the top tool bar. The Amortization spreadsheet will not fit on 1 page, this spreadsheet is 8 pages long. It's better to just submit the entire completed file to Blackboard.

MATHEMATICS USED IN PROJECT 3

The mathematics of Project 3 is a combination of the present value annuity formulas and the simple interest mathematics. That is, to calculate the interest paid for any month, the simple interest formula, $I=PRT$ is used. The principal is the outstanding balance, the rate is the stated annual rate and the time is 1/12 of a year (1 month). The portion paid to reduce the principal balance each month is the amount of the monthly payment minus the amount of simple interest. The monthly payment is calculated from the same formula that was used in Project 7. However, this time the calculation $\frac{R}{12}$ will be called i because it is the periodic interest rate.

$$monthly\ pmt.=\frac{P\times i}{1-(i+1)^{-12t}}$$

Where R = annual Rate, P = Principal, $i = \frac{R}{12}$, and t = time in years.

For example, let P = \$9,000.00, R = 10% (thus $i = \frac{.1}{12} = .00833333$), t = 3 years (36 months). Thus, for a \$9,000 loan at 10% compounded monthly for 3 years the monthly payment is \$290.40. We can calculate the total amount paid by multiplying the payment amount by the number of payments to be made. Total paid = $\$290.40\times12\times3 = \$10,454.40$. Then we can determine the total interest paid by subtracting the original loan amount from the total amount of all payments.

Total interest = $\$10,454.40 - \$9,000.00 = \$1,454.40$

The computer makes an amortization schedule using the argument that follows: For the first month the interest is $9000\times.1\times\frac{1}{12} = 75$ (from $I = PRT$). The amount of the payment that is applied to the principal then is found by subtracting the monthly interest from the payment, $\$290.40 - \$75.00 = \$215.40$. The outstanding principal balance after the payment is made is found by subtracting the payment's principal amount from the principal balance, $\$9,000.00 - \$215.40 = \$8,784.60$.

At this point the calculations for month 2 can be carried out; interest = $\$8748.60.1\times\frac{1}{12} = \$73.21$, Principal = $\$290.40 - 73.21 = \$217.19$, and the outstanding principal balance is now $\$8,784.60 - \$217.19 = \$8,567.41$. And so the calculations go on month after month until the outstanding balance has been reduced to zero. It is interesting to note that each month the interest portion of the payment is lower because the outstanding principal balance has been reduced and so the principal portion of the payment is greater.

PROJECT 3 QUESTIONS

If you have not already done so, reset the information using the sample screens at the beginning of this project.

1. If you borrow $10,000 at 10.5% for four years, what will be the monthly payment, the total interest paid by you and the total paid back by you?

2. Which loan will cost more, a $5,000 loan at 12% for 3 years or a $4,700 loan at 12% for 4 years? The cost of a loan is the total interest paid.

3. If you buy a house with a mortgage of $100,000 at 8.9% for 30 years, how much will your total payments be over the 30 year period? How much of the total payments will be interest?

4. For a loan of $25,000 at 11% for 10 years, use the amortization spreadsheet to determine in which month of the loan will the portion of the monthly payment that goes toward principal be greater than the portion that pays interest.

5. If you need to buy a car and you can only afford a payment of $175.00 per month, approximately how much could you borrow if the time on the loan is 4 years and the rate is 9%?

6. Find the monthly payment and the total interest paid on the following loans:

	PRINCIPAL	RATE	TIME(in years)
a.	$25,000	10.5%	7
b.	$31,000	10%	10
c.	$12,000	9.8%	4
d.	$5,000	11%	2

7. For a $20,000 loan at 12%, find a time in months that will yield a monthly payment of approximately $300.

8. What is the difference in total interest paid on loans of $15,000 at 11% for 4 years and $15,000 at 11% for 5 years? What is the difference in the monthly payment for these loans?

9. What is the difference in total interest paid on loans of $70,000 at 12% for 30 years and $70,000 at 12% for 25 years? What is the difference in the monthly payment for these loans?

10. Using the amortization schedule spreadsheet on a loan of $75,000 at 10% for 30 years and your calculator, find the total interest paid in the first 5 years, then in the second 5 years and in the third and finally in the fourth 5 years.

11. Using the results from Question 10, why is the interest paid in the first five years greater than any other group of five years?

12. If you want to buy a home with a price of $180,000 and the current interest rate is 5% for 30 years; how much money can be saved over the life of the loan by making a down payment of 20% of the price of the house over a 10% down payment? Note the down payment will reduce the amount of the mortgage.

13. You have just graduated from college and found a job in your field. You bought a house and have a 30 year mortgage of $103,500 at 6%, you have student loans totaling $26,000 at 4.5% for 10 years, a car loan of $18,350 at 7.5% for 5 years and a personal credit loan of $5,000 at 9% for 2 years. What is your total indebtedness, what is the total of your monthly loan payments and how much interest will you have paid when all of these loans are retired?

PROJECT 3 ANSWERS

NAME_____ CLASS_____ HOUR_____

1. Monthly Payment_____ Total Interest_____ Total Paid_____

2. Circle the correct answer: $5,000 $4,700

3. Total Cost _____   Interest_____

4. Month_____

5. Amount Borrowed_____

6. Payment   a)_____   b)_____   c)_____   d)_____

    Interest   a)_____   b)_____   c)_____   d)_____

7. Time_____

8. Interest Difference_____   Payment Difference _____
   ____

9. Interest Difference_____   Payment Difference _____
   ____

10. Total interest, 1st 5 years_____   Total interest, 2nd 5 years_____

     Total interest, 3rd 5 years_____   Total interest, 4th 5 years_____

11. _____

12. Savings _____

13. Total Indebtedness_____   Total Payment_____

     Total Interest_____