

BUSINESS UTILITY-1

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INTRODUCTION

Business Utility-1 is the first of two business programs dealing with the areas of real estate, banking, securities, leasing, investment analysis and statistics. The program allows rapid access to frequently occurring business decisions in areas which require rapid and accurate analysis of data.

The sub-programs presented in Business Utility-1 consist of the following:

- 1.1 Linear Regression-Exponential Curve Fit
- 1.2 Accumulated Interest/Remaining Balance
- 1.3 Wrap-Around Mortgage
- 1.4 Discounted Cash Flow Analysis/Net Present Value
- 1.5 Interest At Maturity-Securities
- 1.6 Discounted Securities Analysis
- 1.7 Internal Rate Of Return
- 1.8 Direct Reduction Loans-Sinking Fund
- 1.9 Depreciation Schedules
- 1.10 Amortization Schedules

1.1 LINEAR REGRESSION-EXPONENTIAL CURVE FIT

This sub-program performs a least squares regression to determine both a linear and exponential fit for a given set of data pairs (x,y).

Linear regression is a statistical approach to find a straight line fit for a set of data. The sub-program also determines the "R²" value of each approach to allow the user to determine how well the data fit each curve.

The linear is in the form of $y = a + b x$

The exponential follows the form of $y = a e^{b x}$ ($a > 0$ and $y > 0$)
where $a = 2.718281828$

When finished entering data press "RETURN" as the "x" data entry.

Example: A stocks history is as follows. What growth equation is this following?
Project the expected price at year 6.

<u>Year (x)</u>	<u>Price (y)</u>
1	39.50
2	43.25
3	47.75
4	58.25

Equation is $y = 34.0362e^{.12643x}$
Year 6 projection is \$72.6762399

1.2 ACCUMULATED INTEREST/REMAINING BALANCE

This sub-program determines the total interest paid over a specific number of periods and the remaining balance at the end of the last specified period. Inputs required are:

- * Periodic Interest Rate
- * Periodic Payment Amount
- * Loan Amount
- * Beginning Payment # (J)
- * Ending Payment # (K)

The sub-program can be used for loans with a balloon payment as well as loans arranged to be fully amortized providing these two cautions are observed.

- * The balloon payment must be at the same time as the dollars in addition to the last payment.
- * Do not enter a value of "K" after the last payment since the sub-program does not know the term of the loan.

The data generated is valid for loans that have a balloon payment, as well as those that are arranged to be fully amortized. For loans with a balloon payment, the remaining balance for the last period is the balloon payment due in addition to the last periodic payment.

For loans scheduled to be fully amortized, the remaining balance after the last payment period may be slightly more or less than zero. This is due to the fact the sub-program assumes that all payments are equal to the value entered for PMT. In fact for mortgage loans, the last payment is slightly more or less than the rest.

Example: A mortgage is constructed so that the 1st payment is made at the end of Oct. 1978 (Oct. 1978 is 1st period). It is a \$35,000 loan at 11.5% with monthly payments of \$378.42. What is the accumulated interest from Oct. 1978 to Dec. 1979 (15th payment) and what is the remaining balance at the end of 1979?

Answer: Remaining Balance = \$34309.83
Accumulated Interest = \$4986.13

1.3 WRAP-AROUND MORTGAGE

A wrap-around mortgage is about the same as a refinancing mortgage except that the new mortgage is a junior lien mortgage granted by a different lender who assumes the payments on the existing loan, which continues in full force. The new or second mortgage is thus "wrapped around" the existing mortgage. The wrap-around lender advances the net difference between the second mortgage and the existing mortgage in cash to the borrower, and receives as net cash flow, the difference between debt service on the new (second) mortgage and debt service on the existing mortgage.

The sub-program will calculate periodic yield to the lender of a wrap-around mortgage, with or without a balloon payment. A built-in routine to solve the periodic payment (if unknown) necessary to amortize a mortgage exists internally.

Example 1: You have been approached by a person with an existing mortgage of \$97,500.62, a remaining number of payments of 304 and a \$966.27 monthly payment. He wishes to obtain a \$155,000.00, 10.75% wrap-around mortgage with 304 monthly payments of \$1455.00 and a balloon payment at the end of the 304th month of \$100,000.00. What would be the rate of return to you if you accept this proposition?

Answer: $yield = 10.77\%$

Example 2: You know of a mortgage loan on a multi-family dwelling of \$250,000.00. The loan has a 13 year remaining life and a monthly payment of \$2531.47. You are considering a "wrap" of a \$350,000.00 second mortgage at 10.75%, with full amortization in level monthly payments for 13 years. What is the effective yield to you on cash advanced?

Answer: $yield = 17.70\%$

1.4 DISCOUNTED CASH FLOW ANALYSIS-NET PRESENT VALUE

The user must assume a minimum desired yield. The sub-program then finds the present value of the future cash flows generated by the investment and subtracts the initial investment from this amount. The criteria for success is if the final net present value is positive then the investment exceeds the profit objective assumed. In the same sense, if the final net present value is negative then the investment is not profitable to the extent of the desired yield. Thus if the net present value is greater than zero then the objective was reached. If no cash flow exists for a given period then a zero must be entered. Also all cash flows are assumed to occur at the end of cash flow periods.

The sub-program can be used to find the net present value of a series of irregular cash flows by entering zero for the initial investment.

Note: To exit the enter routine hit "RETURN" for data.

Example 1: You are offered an opportunity to purchase a piece of property for \$52,000.00. You check and find the going rate for this type of investment is 12.86%. You are forecasting the after-tax cash flows as follows. Should you invest in this property?

<u>Year</u>	<u>Cash Flow</u>	<u>Net Present Value</u>
1	\$12,500.00	\$ -40,924.33
2	12,000.00	-31,503.24
3	11,500.00	-23,503.47
4	11,250.00	-16,569.33
5	9,150.00	-11,572.20
6	7,650.00	- 7,870.33
7	56,000.00property sold	16,140.53

Summary: Initial Investment = \$52,000.00
 Cash Flows As Shown
 NPV's As Calculated
 Selling Price = \$56,000.00
 Periodic Interest Rate = 12.86%
 Decision → Yes NPV @ Year 7 \$16,140.53

Example 2: Your company is considering leasing test equipment rather than purchasing. Using the following data produced by your investigation should you recommend leasing or buying the equipment? Remember initial investment is zero.

<u>Year</u>	<u>Purchase</u> <u>Net Cash Cost</u>	<u>Year</u>	<u>Lease</u> <u>Net Cash Cost</u>
1	\$ 3,000.00	1	\$ 5,000.00
2	4,000.00	2	5,000.00
3	5,000.00	3	5,000.00
4	6,000.00	4	5,000.00
5	7,500.00	5	5,000.00
	<u>\$25,500.00</u>	(TOTALS)	<u>\$25,000.00</u>

Looking at total cost, leasing appears to be the better option. However to purchase costs less the first two years and this frees more money to invest elsewhere. Assume your company can realize a 14% return for every dollar invested which is the better option.

Leasing has a present value cost of \$17,165.41 while purchasing has a present value of \$16,532.05. Since both are expensible items, the lowest present value is desirable. Thus in this case Purchasing is the least costly alternative.

1.5 INTEREST AT MATURITY-SECURITIES

This sub-program calculates the price or yield of interest at maturity of securities. The required inputs are the days from issue to maturity, days from settlement to maturity, calendar basis (360 or 365 days), the coupon rate and either the price (to calculate yield) or the yield (to calculate price).

Example 1: Determine the yield of the following interest at maturity security.

Days From Issue To Maturity = 220

Days From Settlement To Maturity = 110

Basis = 360 Days

Coupon Rate = 5.5%

Price = \$98.7567

Answer: Yield = 9.53%

Example 2: Using the data in Example 1, what is the price of this interest security to give a yield of 9.22%?

Answer: Price = \$98.85

1.6 DISCOUNTED SECURITIES ANALYSIS

This sub-program computes the price or yield of discounted securities such as U.S. treasury bills. The required inputs are as follows:

* Number of days from settlement to maturity and one of the following:

* Discount Rate (to calculate Price or Yield)

* Yield (to calculate price)

* Price (to calculate yield)

Example: Given the number of days from settlement to maturity and the discount rate of the following security, find the price and yield.

Days from settlement to maturity = 99

Discount Rate = 5.75%

Answer: Price = \$98.42 Yield = 5.84%

1.7 INTERNAL RATE OF RETURN

The interest rate that equates the present value of all future cash flows with the initial investment is known as the Internal Rate of Return (IRR). This is also known as the discounted rate of return or yield. The initial investment must be greater than zero followed by a number of cash flows. Upon entry of this data the sub-program computes the periodic IRR. The cash flows may be negative or positive. If a period of no cash flows exists, then zero should be entered. When all cash flows have been entered the last cash flow must be a "RETURN" to terminate the input routine.

Example 1: Assume a piece of property requires an initial investment of \$47,500.00.

The property will be sold at the end of 18 months. Assume the property will produce monthly cash flows as shown. What is the IRR?

<u>Month</u>	<u>Cash Flow</u>	<u>Month</u>	<u>Cash Flow</u>
1	\$ 22.50	10	\$270.00
2	51.00	11	261.00
3	192.00	12	57.50
4	205.00	13	127.00
5	201.40	14	140.00
6	196.50	15	136.00
7	147.30	16	131.25
8	152.00	17	206.00
9	189.00	18	62,000.00 (property sold)

Initial Investment = \$47,500.00

Cash Flow As Shown

Property Sold = \$62,000.00

IRR = 1.77% (monthly IRR)

Note: IRR is based on the cash flow period. If the period is per month then the IRR must be multiplied by 12 for an annual IRR result.

Example 2: A piece of property is planned to be purchased at \$200,000.00 initial investment. It will be sold at the end of 5 years. The cash flows expected are as shown.

<u>Year</u>	<u>Cash Flow</u>
1	\$ 51,000.00
2	52,000.00
3	53,000.00
4	54,000.00
5	254,000.00 (property sold)

What is the expected IRR?

Initial Investment = \$ 200,000.00

Cash Flows As Shown

Selling Price @ year 5 = \$254,000.00

IRR = 26.21% (annual IRR)

1.8 DIRECT REDUCTION LOANS-SINKING FUND

This sub-program can be used to solve problems when payments are made at the end of compounding periods (ordinary annuity). Examples are direct reduction loans and mortgages. If an input is asked for and it is not applicable then press "RETURN". i.e. Suppose you wish to compute future value. You are asked interest rate, number of payments, present value, and payment. If payment is not applicable then a "RETURN" response for payment should be done.

Example 1: A 30 year, \$62,000 mortgage has a monthly payment of \$376.50. What is the annual percentage rate. Answer: 6.12%

Example 2: You can afford a \$420 monthly principal and interest payment on a 30 year, 12.5% loan. What is the largest mortgage you can obtain? Answer: \$39,353.19

Example 3: You are planning a trip to Jamaica for you and your wife. You know the cost of the trip will be \$2,700.00. If your saving account is paying 6.75% interest and you put \$100.00 a month into the account how long will it take to save the required amount. Answer: 25 months

Example 4: If you put \$40,000 in an account paying 7.25% interest and put \$100.00 a month into the account for 10 years what will be the resulting balance at the end of 10 years. Answer: \$99,957.96

Example 5: Repeat example 4 except assume you withdraw \$100.00 a month. (enter payment at \$-100.00). Answer: \$64,860.62

1.9 DEPRECIATION SCHEDULES

This sub-program computes three types of depreciation:

- * Straight Line
- * Declining Balance (125%, 150%, 175%, 200%- 200%=Double Declining Balance)
- * Sum Of Years Digits

The required inputs are starting book value, salvage value, life of the depreciation, and declining balance rate. The screen output shows the crossover point from declining balance to straight line.

Example 1: You are depreciating a piece of equipment worth \$50,000.00 with a salvage value of \$3,400 over a 32 year schedule. What is the point to switch from double declining (200%) to straight line depreciation? Answer: 30 year point.

Example 2: Assuming the previous example but a declining balance rate of 125% what is the new crossover point? Answer: 17 years.

1.10 AMORTIZATION SCHEDULES

This sub-program computes an amortization schedule based on the following:

- * Financed Amount
- * Interest Rate (annual)
- * Length Of Loan

This schedule has required rounding to be consistent with most finance companies amortization schedules.

REQUIREMENTS: Applesoft II, 16K of memory without DOS or 32K of memory with DOS (Disk II).

DISCLAIMER: Neither the Author or Powersoft, Inc. guarantee the acceptability of any analysis/calculation in this program by the Internal Revenue Service. Before using data produced by this program as legal data for I.R.S. related functions, I.R.S. approval should be obtained.

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