

Appendix A

Using a Calculator

As you prepare for a career in business, the ability to use a financial calculator is essential, whether you are in the finance division or the marketing department. For most positions, it will be assumed that you can use a calculator in making computations that at one time were simply not possible without extensive time and effort. The following examples let us see what is possible, but they represent only the beginning of using the calculator in finance.

With just a little time and effort, you will be surprised at how much you can do with the calculator, such as calculating a stock's beta, or determining the value of a bond on a specific day given the exact date of maturity, or finding net present values and internal rates of return, or calculating the standard deviation. The list is almost endless.

In demonstrating how calculators may make our work easier, we must first decide which calculator to use. The options are numerous and largely depend on personal preference. We have chosen the Texas Instruments BA II Plus and the Hewlett-Packard 10BII.

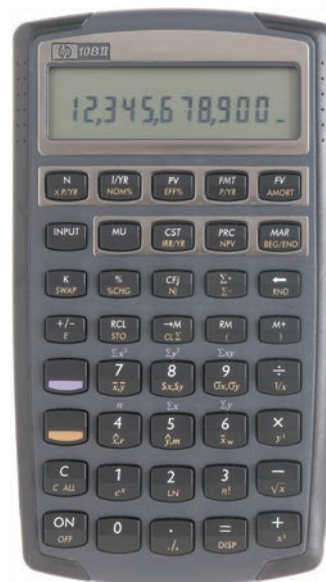
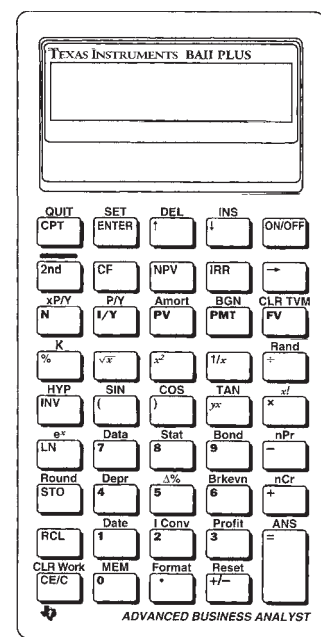
We will limit our discussion to the following issues:

- I. Introductory Comments
- II. An Important Starting Point
- III. Calculating Values for:
 - A. Future value of \$1
 - B. Present value of \$1
 - C. Future value of an annuity of \$1 for n periods
 - D. Present value of an annuity of \$1 for n periods
- IV. Calculating Present Values
- V. Calculating Future Values (compound sum)
- VI. Calculating the Number of Payments or Receipts
- VII. Calculating the Payment Amount
- VIII. Calculating the Interest Rate
- IX. Bond Valuation
 - A. Computing the value of a bond
 - B. Calculating the yield to maturity of a bond
- X. Computing the Net Present Value and Internal Rate of Return
 - A. Where future cash flows are equal amounts in each period (annuity)
 - B. Where future cash flows are unequal amounts in each period

I. Introductory Comments

In the examples that follow, you are told (1) which keystrokes to use, (2) the resulting appearance of the calculator display, and (3) a supporting explanation.

The keystrokes column tells you which keys to press. The keystrokes shown in a white box tell you to use one of the calculator's dedicated or "hard" keys. For example, if $+/-$ is shown in the keystrokes instruction column, press that key on the keyboard of the calculator. With the Texas Instruments BA II Plus, to use a function printed in a shaded box above a dedicated key, always press the shaded key **2nd** first, then the function key. The HP 10BII has two shift keys, one purple (PRP) and one orange (ORG). To use the functions printed in purple (stats) on the keypad, press the purple button first. To use the functions printed in orange (shift) on the keypad, press the orange button first.



II. AN IMPORTANT STARTING POINT - TEXAS INSTRUMENTS BA II PLUS

Example: You want to display four numbers to the right of the decimal.

Keystrokes	Display	Explanation
2nd		
FORMAT	DEC =	
4 ENTER	DEC = 4.0000	Sets display to show four numbers to the right of the decimal
CE/C CE/C	0.0000	Clears display

Example: You want to display two payments per year to be paid at the end of each period.

Keystrokes	Display	Explanation
2nd		
P/Y	P/Y =	
2 ENTER	P/Y = 2.0000	Sets number of payments per year at 2
2nd		
BGN	END	Sets timing of payment at the end of each period
CE/C CE/C	0.0000	Clears display

II. AN IMPORTANT STARTING POINT - HEWLETT-PACKARD 10BII

Example: You want to display four numbers to the right of the decimal. Note that ORG refers to the orange key, which is a “shifted” function used to access the functions printed in orange. There is also a purple shift key that gives you access to the statistical functions in purple.

Keystrokes	Display	Explanation
ORG, C ALL	0.00	Clears registers
ORG, Disp, 4	0.0000	Displays 4 decimal places

Example: You want to display two payments per year to be paid at the end of the period.

Keystrokes	Display	Explanation
ORG, C ALL	0.0000	Clears registers
2, ORG, P/YR	2.0000	Sets payments per year
ORG, BEG/END	2.0000	Sets END mode unless BEGIN enunciator on

III. CALCULATING TABLE VALUES - TEXAS INSTRUMENTS BA II PLUS

A. The future value of \$1

Example: What is the future value or compound sum of \$1 5 years from now at a 12 percent annual interest rate?

Keystrokes	Display	Explanation
2nd		
P/Y	P/Y =	
1 ENTER	P/Y = 1.0000	Sets number of payments per year at 1
2nd		
BGN	END	Sets timing of payment at the end of each period
CE/C CE/C	0.0000	Clears display
2nd		
CLR TVM	0.0000	Clears TVM variables
1 +/-	PV = -1.0000	Stores initial \$1 as a negative present value.
PV		Otherwise the answer will appear as negative.
5 N	N = 5.0000	Stores number of periods
12 I/Y	I/Y = 12.0000	Stores interest rate
CPT FV	FV = 1.7623	Future value

B. The present value of \$1**Example:** What is the present value of \$1 received 8 years from now at a 10 percent annual interest rate?

Keystrokes	Display	Explanation
2nd		
P/Y	P/Y =	
1 ENTER	P/Y = 1.0000	Sets number of payments per year at 1
2nd		
BGN	END	Sets timing of payment at the end of each period
CE/C CE/C	0.0000	Clears display
2nd		
CLR TVM	0.0000	Clears TVM variables
1 +/-	FV = -1.0000	Stores future amount as negative value
FV		
8 N	N = 8.0000	Stores number of periods
10 I/Y	I/Y = 10.0000	Stores interest rate
CPT PV	PV = 0.4665	Present value

C. The future value of an annuity of \$1 for n periods**Example:** What is the future value or compound sum of an annuity of \$1 for 6 years at a 14 percent annual interest rate?

Keystrokes	Display	Explanation
2nd		
P/Y	P/Y =	
1 ENTER	P/Y = 1.0000	Sets number of payments per year at 1
2nd		
BGN	END	Sets timing of payment at the end of each period
CE/C CE/C	0.0000	Clears display
2nd		
CLR TVM	0.0000	Clears TVM variables
1 +/-	PMT = -1.0000	Stores annual payment (annuity) as a negative number.
PMT		Otherwise the answer will appear as a negative.
6 N	N = 6.0000	Stores number of periods
14 I/Y	I/Y = 14.0000	Stores interest rate
CPT FV	FV = 8.5355	Future value

D. The present value of an annuity of \$1 for n periods**Example:** What is the present value of an annuity of \$1 for 12 years at a 9 percent annual interest rate?

Keystrokes	Display	Explanation
2nd		
P/Y	P/Y =	
1 ENTER	P/Y = 1.0000	Sets number of payments per year at 1
2nd		
BGN	END	Sets timing of payment at the end of each period
CE/C CE/C	0.0000	Clears display
2nd		
CLR TVM	0.0000	Clears TVM variables
1 +/-	PMT = -1.0000	Stores annual payment (annuity) as a negative number.
PMT		Otherwise the answer will appear as a negative.
12 N	N = 12.0000	Stores number of periods
9 I/Y	I/Y = 9.0000	Stores interest rate
CPT PV	PV = 7.1607	Present value

III. CALCULATING TABLE VALUES - HEWLETT-PACKARD 10BII**A. The future value of \$1****Example:** What is the future value of \$1 in 5 years at 12 percent annual interest rate?

Keystrokes	Display	Explanation
ORG, C ALL	0.0000	Clears registers
1, ORG, P/YR	1.0000	Sets number of payments per year at 1
ORG, BEG/END	1.0000	Sets timing of payment at the end of each period (If BEGIN shows then press ORG, BEG/END again)
1, +/−, PV	−1.0000	Stores initial \$1 as a negative present value. Otherwise the answer will appear as a negative.
5, N	5.0000	Stores number of periods
12, I/YR	12.0000	Stores interest rate
FV	1.7623	Future value

B. The present value of \$1**Example:** What is the present value of \$1 received 8 years at a 10 percent annual interest rate?

Keystrokes	Display	Explanation
ORG, C ALL	0.0000	Clears registers
1, ORG, P/YR	1.0000	Sets number of payments per year at 1
ORG, BEG/END	1.0000	Sets timing of payment at the end of each period (If BEGIN shows press ORG, BEG/END again)
1, +/−, FV	−1.0000	Stores future amount as negative value
8, N	8.0000	Stores number of periods
10, I/YR	10.0000	Stores interest rate
PV	0.4665	Present value

C. The future value of an annuity of \$1 for n periods**Example:** What is the future value or compound sum of an annuity of \$1 for 6 years at a 14 percent annual interest rate?

Keystrokes	Display	Explanation
ORG, C ALL	0.0000	Clears registers
1, ORG, P/YR	1.0000	Sets number of payments per year at 1
ORG, BEG/END	1.0000	Sets timing of payment at the end of each period (If BEGIN shows press ORG, BEG/END again)
1, +/−, PMT	−1.0000	Stores the annual payment (annuity) as a negative number. Otherwise the answer will appear as a negative.
6, N	6.0000	Stores the number of periods
14, I/YR	14.0000	Stores interest rate
FV	8.5355	Future value

D. The present value of an annuity of \$1 for n periods**Example:** What is the present value of an annuity of \$1 for 12 years at a 9 percent annual interest rate?

Keystrokes	Display	Explanation
ORG, C ALL	0.0000	Clears registers
1, ORG, P/YR	1.0000	Sets number of payments per year at 1
ORG, BEG/END	1.0000	Sets timing of payment at the end of each period (If BEGIN shows press ORG, BEG/END again)
1, +/−, PMT	−1.0000	Stores the annual payment (annuity) as a negative number. Otherwise the answer will appear as a negative.
12, N	12.0000	Stores number of periods
9, I/Y	9.0000	Stores interest rate
PV	7.1607	Future value

IV. CALCULATING PRESENT VALUES - TEXAS INSTRUMENTS BA II PLUS

Example: You are considering the purchase of a franchise of quick oil-change locations, which you believe will provide an annual cash flow of \$50,000. At the end of 10 years, you believe that you will be able to sell the franchise for an estimated \$900,000. Calculate the maximum amount you should pay for the franchise (present value) in order to realize at least an 18 percent annual yield.

Keystrokes	Display	Explanation
2nd		
BGN	END	Sets timing of payment at the end of each period
CE/C CE/C	0.0000	Clears display
2nd		
CLR TVM	0.0000	Clears TVM variables
10 N	N = 10.0000	Stores n , the holding period
18 I/Y	I/Y = 18.0000	Stores i , the required rate of return
50,000 PMT	PMT = 50,000.0000	Stores PMT , the annual cash flow to be received
900,000 FV	FV = 900,000.0000	Stores FV , the cash flow to be received at the end of the project
CPT PV	PV = -396,662.3350	The present value, given a required rate of return of 18 percent. (Note: The present value is displayed with a minus sign since it represents cash paid out.)

IV. CALCULATING PRESENT VALUES - HEWLETT-PACKARD 10BII

Example: You are considering the purchase of a franchise of quick oil-change locations, which you believe will provide an annual cash flow of \$50,000. At the end of 10 years, you believe that you will be able to sell the franchise for an estimated \$900,000. Calculate the maximum amount you should pay for the franchise (present value) in order to realize at least an 18 percent annual yield.

Keystrokes	Display	Explanation
ORG, C ALL	0.0000	Clears registers
ORG, BEG/END	0.0000	Sets timing of payment at the end of each period (If BEGIN shows press ORG, BEG/END again)
10, N	10.0000	Stores n , the holding period
18, I/Y	18.0000	Stores i , the required rate of return
50,000, PMT	50,000.0000	Stores PMT , the annual cash flow to be received
900,000, FV	900,000.0000	Stores FV , the cash flow to be received at the end of the project
PV	-396,662.3350	The present value, given a required rate of return of 18 percent. (Note: The present value is displayed with a minus sign since it represents cash paid out.)

V. CALCULATING FUTURE VALUES (COMPOUND SUM) - TEXAS INSTRUMENTS BA II PLUS

Example: If you deposit \$300 a month (at the beginning of each month) into a new account that pays 6.25 percent annual interest compounded monthly, how much will you have in the account after 5 years?

Keystrokes	Display	Explanation
2nd		
BGN	END	Sets timing of payment at the end of each period
2nd		
SET	BGN	Sets timing of payments to beginning of each period
2nd		
P/Y	P/Y =	
12 ENTER	P/Y = 2.0000	Sets 12 payments per year
CE/C CE/C	0.0000	Clears display

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Keystrokes	Display	Explanation
2nd		
CLR TVM	0.0000	Clears TVM variables
60 N	N = 60.0000	Stores n , the number of months for the investment
6.25 I/Y	I/Y = 6.2500	Stores i , the annual rate
300 +/- PMT	PMT = -300.0000	Stores PMT , the monthly amount invested (with a minus sign for cash paid out)
CPT FV	FV = 21,175.7613	The future value after 5 years

V. CALCULATING FUTURE VALUES (COMPOUND SUM) - HEWLETT-PACKARD 10BII

Example: If you deposit \$300 a month (at the beginning of each month) into a new account that pays 6.25 percent annual interest compounded monthly, how much will you have in the account after 5 years?

Keystrokes	Display	Explanation
ORG, C ALL	0.0000	Clears registers
ORG, BEG/END	0.0000(BEGIN)	Sets timing of payments to beginning of each period
12, ORG, P/YR	12.0000	Sets 12 payments per year
60, N	60.0000	Stores n , the number of months for the investment
6.25, I/Y	6.2500	Stores i , the annual rate
300, +/-, PMT	-300.0000	Stores PMT , the monthly amount invested (with a minus sign for cash paid out)
FV	21,175.7613	The future value after 5 years

VI. CALCULATING THE NUMBER OF PAYMENTS OR RECEIPTS - TEXAS INSTRUMENTS BA II PLUS

Example: If you wish to retire with \$500,000 saved, and can only afford payments of \$500 at the beginning of each month, how long will you have to contribute toward your retirement if you can earn a 10 percent return on your contributions?

Keystrokes	Display	Explanation
2nd		
BGN	BGN	Verifies timing of payment at the beginning of each period
2nd		
P/Y	P/Y = 12.0000	
12 ENTER	P/Y = 12.0000	Sets 12 payments per year
CE/C CE/C	0.0000	Clears display
2nd		
CLR TVM	0.0000	Clears TVM variables
10 I/Y	I/Y = 10.0000	Stores i , the interest rate
500 +/- PMT	PMT = -500.0000	Stores PMT , the monthly amount invested (with a minus sign for cash paid out)
500,000 FV	FV = 500,000.0000	The value we want to achieve
CPT N	N = 268.2539	Number of months (since we considered monthly payments) required to achieve our goal

VI. CALCULATING THE NUMBER OF PAYMENTS OR RECEIPTS - HEWLETT-PACKARD 10BII

Example: If you wish to retire with \$500,000 saved and can only afford payments of \$500 at the beginning of each month, how long will you have to contribute toward your retirement if you can earn a 10 percent return on your contributions?

Keystrokes	Display	Explanation
ORG, C ALL	0.0000	Clears registers
ORG, BEG/END	0.0000 (BEGIN)	Sets timing of payments to beginning of each period

12, ORG, P/YR	12.0000	Sets 12 payments per year
10, I/YR	10.0000	Stores i , the interest rate
500, + / - MT	500.0000	Stores PMT , the monthly amount invested (with a minus sign for cash paid out)
500,000, FV	500,000.0000	The value we want to achieve
N	268.2539	Number of months (since we considered monthly payments) required to achieve our goal

VII. CALCULATING THE PAYMENT AMOUNT - TEXAS INSTRUMENTS BA II PLUS

Example: Suppose your retirement needs were \$750,000. If you are currently 25 years old and plan to retire at age 65, how much will you have to contribute at the beginning of each month for retirement if you can earn 12.5 percent on your savings?

Keystrokes	Display	Explanation
2nd		
BGN	BGN	Verifies timing of payment at the beginning of each period
2nd		
P/Y	P/Y = 12.0000	
12 ENTER	P/Y = 12.0000	Sets 12 payments per year
CE/C CE/C	0.0000	Clears display
2nd		
CLR TVM	0.0000	Clears TVM variables
12.5 I/Y	I/Y = 12.5000	Stores i , the interest rate
480 N	N = 480.0000	Stores n , the number of periods until we stop contributing (40 years $\times$ 12 months/year = 480 months)
750,000 FV	FV = 750,000.0000	The value we want to achieve
CPT PMT	PMT = -53.8347	Monthly contribution required to achieve our ultimate goal (shown as negative since it represents cash paid out)

VII. CALCULATING THE PAYMENT AMOUNT - HEWLETT-PACKARD 10BII

Example: Suppose your retirement needs are \$750,000. If you are currently 25 years old and plan to retire at age 65, how much will you have to contribute at the beginning of each month for retirement if you can earn 12.5 percent on your savings?

Keystrokes	Display	Explanation
ORG, C ALL	0.0000	Clears registers
ORG, BEG/END	0.0000(BEGIN)	Sets timing of payments to the beginning of each period
12, ORG, P/YR	12.0000	Sets 12 payments per year
12.5, I/YR	12.5000	Stores i , the interest rate
480 N	N = 480.0000	Stores n , the number of periods until we stop contributing (40 years $\times$ 12 months/year = 480 months)
750,000, FV	750,000.0000	The value we want to achieve
PMT	-53.8347	Monthly contribution required to achieve our ultimate goal (shown as a negative since it represents cash paid out)

VIII. CALCULATING THE INTEREST RATE - TEXAS INSTRUMENTS BA II PLUS

Example: If you invest \$300 at the end of each month for 6 years (72 months) for a promised \$30,000 return at the end, what interest rate are you earning on your investment?

Keystrokes	Display	Explanation
2nd		
BGN	BGN	Sets timing of payments to beginning of each period

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Keystrokes	Display	Explanation
2nd SET	END	Sets timing of payments to end of each period
2nd P/Y	P/Y = 12.0000	
12 ENTER	P/Y = 12.0000	Sets 12 payments per year
CE/C CE/C	0.0000	Clears display
2nd CLR TVM	0.0000	Clears TVM variables
72 N	N = 72.0000	Stores n , the number of deposits (investments)
300 +/- PMT	PMT = -300.0000	Stores PMT , the monthly amount invested (with a minus sign for cash paid out)
30,000 FV	FV = 30,000.0000	Stores the future value to be received in 6 years
CPT I/Y	I/Y = 10.5892	The annual interest rate earned on the investment

VIII. CALCULATING THE INTEREST RATE - HEWLETT-PACKARD 10BII

Example: If you invest \$300 at the end of each month for 6 years (72 months) for a promised \$30,000 return at the end, what interest rate are you earning on your investment?

Keystrokes	Display	Explanation
ORG, C ALL	0.0000	Clears registers
ORG, BEG/END	0.0000	Sets timing of payments to the end of each period
72, N	72.0000	Stores n , the number of deposits (investments)
300, +/-, PMT	-300.0000	Stores PMT , the monthly amount invested (with a minus sign for cash paid out)
30,000, FV	30,000.0000	Stores the future value to be received in 6 years
I/YR	10.5892	The annual interest rate earned on the investment

IX. BOND VALUATION - TEXAS INSTRUMENTS BA II PLUS

A. Computing the value of a bond

Example: Assume the current date is January 1, 2006, and that you want to know the value of a bond that matures in 10 years and has a coupon rate of 9 percent (4.5 percent semiannually). Your required rate of return is 12 percent.

Keystrokes	Display	Explanation
2nd BGN	END	Verifies timing of payments to end of each period
2nd P/Y	P/Y = 12.0000	
2 ENTER	P/Y = 2.0000	Sets 2 payments per year; end mode (END) assumes cash flows are at the end of each 6-month period
CE/C CE/C	0.0000	Clears display
2nd CLR TVM	0.0000	Clears TVM variables
20 N	N = 20.0000	Stores the number of semiannual periods (10 years $\times$ 2)
12 I/Y	I/Y = 12.0000	Stores annual rate of return
45 PMT	PMT = 45.0000	Stores the semiannual interest payment
1,000 FV	FV = 1,000.0000	Stores the bond's maturity or par value
CPT PV	PV = -827.9512	Value of the bond, expressed as a negative number
SOLUTION Using the Bond Feature:		
CE/C CE/C	0.0000	Clears display
2nd BOND	SDT = 1-01-1970	(This will be the last date entered)

2nd		
CLR WORK	SDT = 1-01-1970	Clears BOND variables
1.01.06 ENTER	SDT = 1-01-2006	Stores the current date (month, date, year)
↓	CPN = 0.0000	
9 ENTER	CPN = 9.0000	Stores the coupon interest rate
↓	RDT = 12-31-1990	(This will be the last date entered)
1.01.16 ENTER	RDT = 1-01-2016	Stores the maturity date in 10 years
↓	RV = 100.0000	Verifies bond maturity or par value
↓	ACT	
2nd		
SET	360	Sets calculations to be based on 360-day year
↓	2/Y	Verifies semiannual compounding rate
↓	YLD = 0.0000	
12 ENTER	YLD = 12.0000	Stores the investor's required rate of return
↓	PRI = 0.0000	
CPT	PRI = 82.7951	Value of bond as a percent of par value; i.e., value of bond is \$827.95
B. Computing the yield to maturity of a bond		
Example: Assume the current date is January 1, 2006, and that you want to know your yield to maturity on a bond that matures in 8 years and has a coupon rate of 12 percent (6 percent semiannually). The bond is selling for \$1,100.		
Keystrokes	Display	Explanation
2nd		
BGN	END	Verifies timing of payments to end of each period
2nd		
P/Y	P/Y = 12.0000	
2 ENTER	P/Y = 2.0000	Sets 2 payments per year; end mode (END) assumes cash flows are at the end of each 6-month period
CE/C CE/C	0.0000	Clears display
2nd		
CLR TVM	0.0000	Clears TVM variables
16 N	N = 16.0000	Stores the number of semiannual periods (8 years × 2)
1100 +/- PV	PV = -1,100.0000	Value of the bond, expressed as a negative number
60 PMT	PMT = 60.0000	Stores the semiannual interest payments
1,000 FV	FV = 1,000.0000	Stores the bond's maturity or par value
CPT I/Y	I/Y = 10.1451	The yield to maturity, expressed on an annual basis
SOLUTION Using the Bond Feature:		
CE/C CE/C	0.0000	Clears display
2nd		
Bond	SDT = 1-01-1993	(This will be the last date entered)
2nd		
CLR WORK	SDT = 1-01-1993	Clears BOND variables
1.01.06 ENTER	SDT = 1-01-2006	Stores the current date (month, date, year)
↓	CPN = 0.0000	
12 ENTER	CPN = 12.0000	Stores the coupon interest rate
↓	RDT = 1-01-2003	(This will be the last date entered)
1.01.14 ENTER	RDT = 1-01-2014	Stores the maturity date in 8 years
↓	RV = 100.0000	Verifies bond's maturity or par value
↓	360	
2nd		

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Keystrokes	Display	Explanation
SET	ACT	Sets calculations to be based on 360-day year
↓	2/Y	Verifies semiannual compounding rate
↓	YLD = 0.0000	
↓	PRI = 0.0000	
110 ENTER	PRI = 110.0000	Stores the bond value as a percentage of par value
↑	YLD = 0.0000	
CPT	YLD = 10.1451	Bond's yield to maturity

IX. BOND VALUATION - HEWLETT-PACKARD 10BII

A. Computing the value of a bond

Example: Assume the current date is January 1, 2006, and that you want to know the value of a bond that matures in 10 years and has a coupon rate of 9 percent (4.5 percent semiannually). Your required rate of return is 12 percent.

Keystrokes	Display	Explanation
ORG, C ALL	0.0000	Clears registers
2, ORG, P/YR	2.0000	Sets payments at 2 per year END mode
20, N	20.0000	Stores the number of semiannual periods
12, I/YR	12.0000	Stores annual rate of return
45, PMT	45.0000	Stores the semiannual interest payments
1000, FV	1,000.0000	Stores the bond's maturity or par value
PV	-827.9512	Value of the bond, expressed as a negative number

B. Computing the yield to maturity of a bond

Example: Assume the current date is January 1, 2006, and that you want to know your yield to maturity on a bond that matures in 8 years and has a coupon rate of 12 percent (6 percent semiannually). The bond is selling for \$1,100.

Keystrokes	Display	Explanation
ORG, C ALL	0.0000	Clears registers
2, ORG, P/YR	2.0000	Sets payments at 2 per year END mode
16, N	16.0000	Stores the number of semiannual periods (8 years $\times$ 2)
1100, + / - , PV	-1,100.0000	Value of the bond expressed as a negative number
60, PMT	60.0000	Stores the semiannual interest payments
1000, FV	1,000.0000	Stores the bond's maturity or par value
I/YR	10.1451	The yield to maturity expressed on an annual basis

X. COMPUTING THE NET PRESENT VALUE AND INTERNAL RATE OF RETURN - TEXAS INSTRUMENTS BA II PLUS

A. Where future cash flows are equal amounts in each period (annuity)

Example: The firm is considering a capital project that would cost \$80,000. The firm's cost of capital is 12 percent. The project life is 10 years, during which time the firm expects to receive \$15,000 per year. Calculate the *NPV* and *IRR*.

Keystrokes	Display	Explanation
2nd		
BGN	END	Verifies timing of payments to end of each period
2nd		
P/Y	P/Y = 12.0000	
1 ENTER	P/Y = 1.0000	Sets 1 payment per year; end mode (END) assumes cash flows are at the end of each year
CE/C CE/C	0.0000	Clears display

2nd		
CLR TVM	0.0000	Clears TVM variables
15,000 PMT	PMT = 15.0000	Stores the annual cash flows of \$15,000
10 N	N = 10.0000	Stores the life of the project
12 I/Y	I/Y = 12.0000	Stores the cost of capital
CPT PV	PV = -84,753.3454	Calculates present value
+/-	84,753.3454	Changes <i>PV</i> to positive
-80,000 =	4,753.3454	Calculates net present value by subtracting the cost of the project
80,000 +/-	-80,000.0000	
PV	PV = -80,000.0000	
CPT I/Y	I/Y = 13.4344	Calculates the <i>IRR</i>
B. Where future cash flows are unequal amounts in each period		
Example: The firm is considering a capital project that would cost \$110,000. The firm's cost of capital is 15 percent. The project life is 5 years, with the following expected cash flows: - \$ 25,000, \$50,000, \$60,000, \$60,000 and \$70,000. In addition, you expect to receive \$30,000 in the last year from the salvage value of the equipment. Calculate the <i>NPV</i> and <i>IRR</i> .		
Keystrokes	Display	Explanation
CE/C CE/C	0.0000	Clears display
CF	CF ₀ = 0.0000	
2nd		
CLR WORK	CF ₀ = 0.0000	Clears cash flow variables
110,000 +/-	CF ₀ = -110,000.0000	Stores CF ₀ , the initial investment (with a minus sign for a negative cash flow)
ENTER		
↓	CO1 = 0.0000	Stores CF ₁ , the first year's cash flow (with a minus sign for a negative cash flow)
250,000 +/-	CO1 = -25,000.0000	
ENTER		
↓	FO1 = 1.0000	Stores the number of years CF ₁ is repeated (in this case, 1 year only)
ENTER		
↓	CO2 = 0.0000	
50,000	CO2 = 50,000.0000	Stores CF ₂
ENTER		
↓	FO2 = 1.0000	
ENTER	FO2 = 1.0000	Stores the number of years CF ₂ is repeated
↓	CO3 = 0.0000	
60,000	CO3 = 60,000.0000	Stores CF ₃
ENTER		
↓	FO3 = 2.0000	Stores the number of years CF ₃ is repeated
2 ENTER		(here, 2 years, so our response is 2 to the FO ₃ prompt)
↓	CO4 = 0.0000	
100,000	CO4 = 100,000.0000	Stores CF ₄ , \$70,000 plus expected \$30,000
ENTER		
↓	FO4 = 1.0000	Stores the number CF ₄
ENTER		
2nd		
QUIT	0.0000	Ends storage of individual cash flows
NPV	I = 0.0000	
15 ENTER	I = 15.0000	Stores interest rate

(continues on next page)

Keystrokes	Display	Explanation
↓	NPV = 0.0000	
CPT	NPV = 29,541.8951	Calculates the project's <i>NPV</i> at the stated interest rate
IRR	IRR = 0.0000	
CPT	IRR = 22.0633	Calculates the project's <i>IRR</i>

X. COMPUTING THE NET PRESENT VALUE AND INTERNAL RATE OF RETURN - HEWLETT-PACKARD 10BII

A. Where future cash flows are equal amounts in each period (annuity)

Example: The firm is considering a capital project that would cost \$80,000. The firm's cost of capital is 12 percent. The project life is 10 years, during which time the firm expects to receive \$15,000 per year. Calculate the *NPV* and *IRR*.

Keystrokes	Display	Explanation
ORG, C ALL	0.0000	Clears registers
ORG, BEG/END	0.0000	Verifies timing of payments to end of each period
1, ORG, P/YR	1.0000	Sets 1 payment per year; end mode (END); assumes cash flows are at the end of each year
15,000, PMT	15,000.0000	Stores annual cash flows of \$15,000
10, N	10.0000	Stores the life of the project
12, I/YR	12.0000	Stores the cost of capital
PV	-84,753.3454	Calculates present value
+/-	84,753.3454	Changes <i>PV</i> to positive
-80,000, =	4753.3454	Calculates net present value by subtracting the cost of the project
80,000, +/-	-80,000.0000	
PV	-80,000.0000	
I/YR	13.4344	Calculates the <i>IRR</i>

B. Where future cash flows are unequal amounts in each period

Example: The firm is considering a capital project that would cost \$110,000. The firm's cost of capital is 15 percent. The project life is 5 years, with the following expected cash flows: -\$25,000, \$50,000, \$60,000, \$60,000, and \$70,000. In addition, you expect to receive \$30,000 in the last year from the salvage value of the equipment. Calculate the *NPV* and *IRR*.

Keystrokes	Display	Explanation
ORG, C ALL	0.0000	Clears registers
1, ORG, P/YR	1.0000	Sets 1 payment per year END mode
110,000, +/- CFj	-110,000.0000	Stores CF ₀ , the initial investment (with a minus sign for negative cash flow)
250,000 +/-, CFj	-25,000.0000	Stores CF ₁ , the first year's cash flow (with a minus sign for negative cash flow)
50,000, CFj	50,000.0000	Stores CF ₂
60,000, CFj	60,000.0000	Stores CF ₃
2, ORG, Nj	2.0000	Stores the number of years CF ₃ is repeated
100,000, CFj	100,000.0000	Stores CF ₄ , \$70,000 plus expected \$30,000
15, I/YR	15.0000	Stores interest rate
ORG, NPV	29,541.8951	Calculates the project's <i>NPV</i> at the stated interest rate
ORG, IRR/YR	22.0633	Calculates the project's <i>IRR</i>