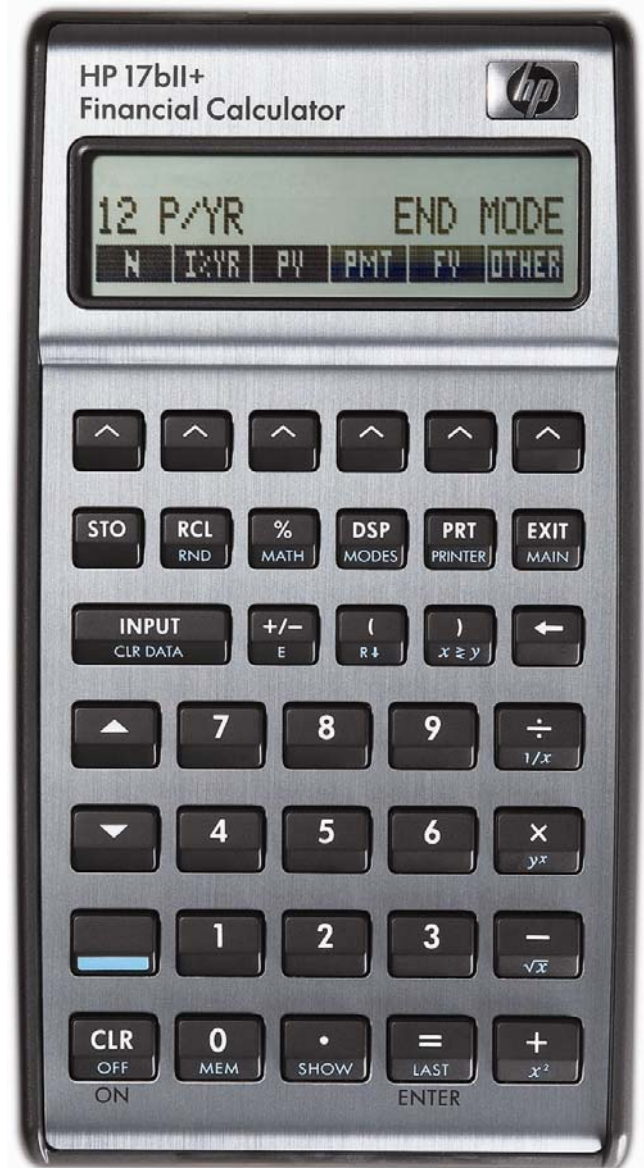# hp calculators

HP 17bII+ Cash flow analysis –
Internal Rate of Return

Cash flow analysis

Internal Rate of Return

Entering cash flows

Practice solving Internal Rate of Return problems

Cash flow analysis

There are times when a financial problem has either irregular or unequal payments. Since the time value of money application is not designed for these situations, the HP 17bII+ contains functions that solve these types of problems, commonly referred to as cash flow (CFLO) analysis.

As usually presented, CFLO problems have an initial negative cash flow followed by several positive cash flows. This might occur when a company is evaluating the purchase of a new machine. There would be an initial cash outlay to pay for the machine and then (hopefully) several periods of positive cash inflow as the result of the acquisition. Cash outflows are considered negative while inflows are considered positive.

CFLO problems routinely occur within financial applications such as capital budgeting, but the functionality built into the HP 17bII+ calculator is more flexible, allowing for the more general analysis of uneven and irregular payment situations.

Internal Rate of Return

The Internal Rate of Return (IRR) is defined as the interest rate that makes the present value of all future cash flows equal to the initial cash flow. By definition, this will be where the Net Present Value (NPV) is equal to zero. The IRR is computed so that it can be compared to a target or hurdle return. This rate to which it is compared is usually either the company's cost of funds or a required rate of return.

On the HP 17bII+, CFLO problems involving IRR are solved in the CFLO environment. This is entered by pressing **FIN** then **CFLO**.

```
0.00
FIN | BUS | SUM |TIME|SOLVE|CURRX       Figure 1

SELECT A MENU
TVM |ICNV| CFLO |BOND|DEPRC             Figure 2

FLOW(0)=?
CALC |INSR |DELET|NAME| GET | #T?       Figure 3
```

On this screen, the menu keys on the bottom of the display perform these functions:

CALC – Ends the entry of cash flow data and enters the cash flow calculation environment.

INSR – Creates an empty entry in the cash flow list to allow for the insertion of a cash flow.

DELET – Deletes the currently displayed cash flow entry from the cash flow list.

NAME – Allows the present cash flow list to be saved as a named list in calculator memory.

GET – Used to retrieve a previously named cash flow list from memory. Or, to start a new list, press **GET** then ***NEW**., if you have already saved the current list.

#T? – Toggles prompting for the number of times a cash flow occurs on or off. Default is ON. If turned off, the value used for the number of times a cash flow occurs is 1. The maximum value for this setting is 999. This setting is always turned on when you start a new cash flow list.

HP 17bII+ Cash flow analysis – Internal Rate of Return

The HP 17bII+ uses a different approach to handling cash flow problems than other HP calculators. Rather than storing the cash flows in registers, the HP 17bII+ stores cash flows in lists that can be named and saved for future use. This also provides the flexibility to have multiple cash flow situations stored within the calculator at the same time. The number of cash flow analyses and individual cash flows stored in this manner are only limited by the available calculator memory.

Maintaining a cash flow list is covered in more detail in another learning module.

Entering cash flows

The initial cash flow is keyed (and changed to a negative number if appropriate) and entered using the ⬚INPUT⬚ key. If prompting for the number of times a cash flow occurs is turned on, you will need to enter the frequency for the cash flow and press ⬚INPUT⬚ again. If the default frequency of 1 is desired, then you can press ⬚INPUT⬚ twice in succession to proceed to the next cash flow. The remaining cash flows are entered in the same manner. When you have entered all cash flows, press press ⬚EXIT⬚ followed by ⬚CALC⬚ to enter the calculation environment, which appears as shown below.

```
NPV, NUS, NFV NEED I%
TOTAL IRR% I% NPV NUS NFV
```
Figure 4

NOTE: The interest rate entered in the calculation environment is the PERIODIC interest rate. If the cash flows are monthly, then the interest rate should be the monthly interest rate. For example, if the interest rate is 6%, compounded monthly, and the cash flows being evaluated are monthly, then the interest rate entered should be 0.5.

Practice solving Internal Rate of Return problems

Example 1:   A company is considering replacing a machine. It will require an initial cash outlay of $20,000 and then is expected to generate cash flows the next 3 years of $10,000, $15,000 and $20,000. If the cost of funds for the company is estimated at 10%, compute the IRR and compare it to the cost of funds. Should the machine be replaced?

Solution:
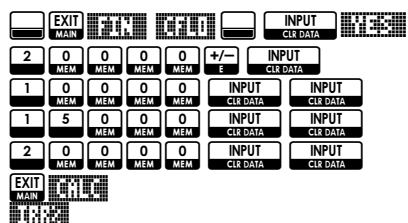
Answer: $47.15%. Since this is larger than the cost of funds, using IRR the machine should be replaced.

Example 2:   A company is considering introducing a new product. It will require an initial cash outlay of $1,250,000 and the company expects to get cash flows the next 6 years of -$300,000, $200,000, $450,000, $700,000, $300,000 and $20,000. If the company's cost of funds is estimated at 12%, compute the IRR and compare it to the cost of funds? Should the company introduce the new product?
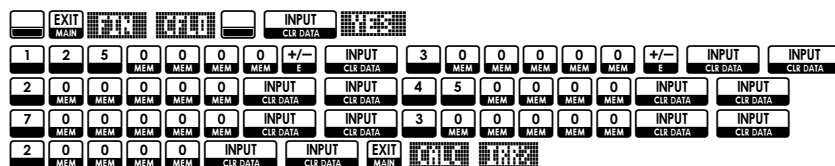
Solution:

Answer: 2.16%. Since this is less than the cost of funds, the company should not introduce the new product. Note that both of the first two cash flows were negative or cash outflows. Introducing a new product can often cause that situation.

Example 3: A company is considering expanding a product line, which will require an investment today of $800,000. Future cash inflows are estimated to be $190,000 a year for 6 years followed by $90,000 a year for the 4 years thereafter. If the company's cost of funds is 15%, compute the IRR and compare it to the cost of funds. Should the product line be expanded? As a check, enter the IRR as the cost of funds and compute the NPV. Verify that it is equal to zero.

Solution:
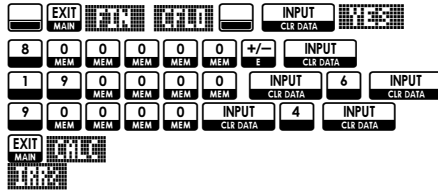
Answer: 16.13%. Since this is larger than the company's cost of funds, the product line should be expanded. Also note that when the NPV is evaluated using the IRR as the cost of funds, the NPV is equal to zero (or very, very close to zero), so the computed value for the IRR is correct.