

Week 11 Excel: Financial functions:

Excel has five built-in financial functions that all pertain to the following kind of situation:

- An account (e.g. a loan, or a fixed-interest retirement account) with fixed periodic payments and interest compounded on the same period as the payments.

The five functions all involve the following five quantities:

- RATE** - the interest rate (per period)
- PMT** - the amount of the periodic payment
- PV** - the “present” value of the account
- FV** - the “future” value of the account
- NPER** - the number of periods between “present” and “future”.

Each of the five functions finds one of these quantities in terms of the other four. Each function has the same name as the quantity that it finds (e.g. the **PMT** function finds the periodic payment).

Each function has three required arguments and two optional arguments, as follows:

```
PMT(rate,nper,pv,[fv],[type])  
PV(rate,nper,pmt,[fv],[type])  
FV(rate,nper,pmt,[pv],[type])  
RATE(nper,pmt,pv,[fv],[type])  
NPER(rate,pmt,pv,[fv],[type])
```

Above, the square brackets indicate optional arguments, whose values are zero, by default, if the argument is omitted.

The “**type**” argument has to do with whether the payment is made at the beginning or end of the period on which the interest is compounded. This is a detail that’s important if you are actually using these functions in real life, but we will ignore it for now, just to keep things simpler.

In four out of five of the above functions, the **fv** (future value) parameter is optional, with a default value of zero. That’s because these functions are usually used in connection with loans, where the goal is to get the loan completely paid off. When the loan is completely paid off, its value is zero. So we assume a future value of zero when computing what is necessary to get the loan completely paid off.

On the other hand, the **FV** function is more likely to be used not with loans but with other situations, such as a fixed-interest retirement account with regular contributions from your employer. So it makes sense for the **FV** function’s **pv** (present value) parameter to be zero, e.g. there isn’t yet any money in your retirement account when you first start the job.

Week 11 Excel: Simple PMT function example

	A	B	C	D	E	F	G
1							
2							
3							
4							
5			Amount of loan:	\$50000.00			
6			Annual interest:	8 %			
7			Years to pay:	5			
8			Monthly payment:				
9							
10							
11							
12							
13							
14							
15							

Note the difference in time units. Some quantities use months, others use years.

We must make our time units consistent.

Do we convert years to months or months to years?

Week 11 Excel: More interesting PMT function example

Below we look at several different possible payment plans for a loan of \$50,000, and determine the monthly payment for each:

	A	B	C	D	E	F	G
1							
2							
3			Amount of loan:		\$50000.00		
4							
5							
6		Annual Interest	Years to pay	Monthly payment			
7		8 %	5				
8		9 %	10				
9		10 %	15				
10		11 %	20				
11							
12							
13							
14							
15							

Write a correctly draggable formula for the monthly payment.

Week 11 Excel: PV function example

Suppose your bank needs to determine how big a loan it is willing to give you, having estimated what you can afford under various payment plans with the same current interest rate:

	A	B	C	D	E	F	G
1							
2							
3			Annual interest rate:				9 %
4							
5							
6		Monthly payment	Years to pay	Affordable total loan amount			
7		\$500.00	5				
8		\$450.00	10				
9		\$400.00	15				
		\$350.00	20				
11							
12							
13							
14							
15							

Write a correctly draggable formula for the total loan amount.

Week 11 Excel: FV function example

Suppose you got very lucky and got four job offers in one day. One of your criteria for deciding which job to choose is their retirement plan. Suppose they all offer plans with fixed monthly contributions and fixed interest rates. What would the value of each plan be after 20 years?

	A	B	C	D	E	F	G
1							
2							
3					Years to retirement:		20
4							
5							
6		Monthly contribution	Annual interest rate	Value at Retirement			
7		\$130.00	1.5 %				
8		\$125.00	1.8 %				
9		\$120.00	2.1 %				
		\$100.00	2.2 %				
11							
12							
13							
14							
15							

Write a correctly draggable formula for the value at retirement if you were to stay with the company for 20 years.