Panel 1

Last Time.

Compound Interest Formula:

Effective Rate Formula:

Present Value

1

Panel 2

Ex: Suppose you need $1,000 in three years, and your bank offers 9% compounded monthly. Find the present value of $1,000 in 3 years.

2

Panel 3

Present Value	*The PV function returns the present value of an investment. The present value is the total amount that a series of future payments is worth now. For example, when you borrow money, the loan amount is the present value to the lender.*
Excel Formula:	**=PV(rate, nper, pmt, fv)**, where
rate:	is the interest rate per period.
nper:	is the total number of payment periods in an annuity.
pmt:	is the payment made each period; it cannot change over the life of the annuity.
fv:	is the future value, or a cash balance you want to attain after the last payment is made.

3

Panel 4

Example:	*Find the present value of $1000 due after 3 years if the interest rate is 9% compounded monthly.*		
Solution:			
	Interest rate:	*0.09*	
	Compound Periods:	*12*	
	Number of years:	*3*	
	rate:	**0.0075**	*= Interest rate / compound periods*
	nper:	**36**	*= Number of years * compound periods*
	pmt:	**0**	
	fv:	**1000**	
	PV(rate, nper, pmt, fv) =	**($764.15)**	

4

Panel 5

Ex: A trust fund for a child should yield $50,000 in 15 years at 7% comp. semiannually. How much should you invest?

PV(rate, nper, pmt, fv)

↑

$\frac{0.07}{2}$, 30, 0, 50000)

5

Panel 6

Ex: A trust fund should yield $50000 after 15 years, at 7% compounded semiannually, and every period we make a payment of $100.

PV($\frac{0.07}{2}$, 30, 100, 50000) = $15 974

6

Panel 7

Other useful Excel formulas for financial math

Future value:

FV(rate, nper, pmt, pv)

rate = rate of interest per period

nper = # of periods

pmt = payment per period

pv = present value, or initial amount!

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Panel 8

Ex: Invest $1000 at 8% compounded quarterly for 7 years.

$S = 1000\left(1+\frac{0.08}{4}\right)^{20} =$

$= FV\left(\frac{0.08}{4}, 20, 0, -1000\right) =$ } $1485

8

Panel 9

Ex: Value of $1000 at 8% compounded quarterly in 5 years if $100 payments are made every quarter.

$$FV\left(\frac{0.08}{4}, 20, -100, -1000\right) = \$3915.-$$

Estimate: 8% of 1000 = 80 × 5 = $400
100 · 20 = $2000
initial amt: = $1000
$3400.- more

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Panel 10

Ex: What is the present value of $3915.68 in 5 years at 8% compounded quarterly, if $100 payments are made?

$$= PV\left(\frac{0.08}{4}, 20, -100, 3915.68\right) = \$1000$$

PV and FV are inverse of each other!

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Panel 11

Annuities: a finite sequence of payments made at fixed periods over a given interval

Ex:
- a pension
- car payments
- mortgage payments for a house

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Panel 12

Ex: Suppose you can afford payments of $100 per month for a loan at 6% compounded monthly over 3 1/2 years. How much money is this worth now?

① You pay: $100 × 12 × 3.5 = $4200.-

② = PV(0.06/12, 12·3.5, -100, 0) = $3774.- ← difference in profit to Bank

Change rate to 10%. Do I get more or less?

$3531 – less

12

Panel 13

The "Payment" Function: calculates the payments per period for a loan at fixed conditions

= PMT(rate, nper, pv, fv)

rate = rate per period

nper = # of periods

pv = present value, or loan amount (NEGATIVE) Bank's point of view

fv = usually zero

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Panel 14

Ex: The bank loans you $3779.93 over 3 ½ years at 6% compounded monthly. What are the monthly payments?

= PMT($\frac{0.06}{12}$, 12·3.5, −3779.93, 0)

14

Panel 15

Ex: You get a short-term loan of $1500 over 3 months at a nominal rate of 12% compounded monthly. What are your monthly rates?

① Estimate: $1500 in 3 installments = $500 each month
interest per month is $15 (1% of $1500)
⇒ monthly payments should be ~ $515.-

② = PMT(0.12/12, 3, -1500, 0) = $510.03 ← why?
1
0.01

15

Panel 16

Loan $1500 at 12% compounded monthly for 3 months.

	you owe	interest	pmt	pay off
month 1	1500	0.01·1500 = 15	510.03	510.03 − 15 = 495.03
month 2	1500 − 495.03 = 1004.97	1004.97·0.01 = 10.05	510.03	510.03 − 10.05 = 499.98
month 3	1004.97 − 499.98 = 504.99	504.99·0.01 = 5.05	510.03	510.03 − 5.05 = 504.98
		30.09		(1530.09) → 1500

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