Panel 1

Summary

Compound interest: $S = P(1+r)^n$

Effective rate: $r_e = \left(1+\frac{r}{n}\right)^n - 1$

Present Value: = PV(rate, nper, pmt, fv)

Future Value: = FV(rate, nper, pmt, pv)

Payments: = PMT(rate, nper, pv)

1

Panel 2

(1) You sign for a loan with payments of $200 per month at 10% over 10 years compounded monthly (PV)

(2) You want to setup a trust fund of $50,000 in 15 years at 3% interest compounded monthly with monthly payments of $150.- (PV)

(3) You invest $150 per month at 7% compounded monthly for 4 years. How much will you have? (FV)

(4) You take out a loan for $20,000 over 5 years at 4% interest compounded monthly. Payments per month? (PMT)

2

Panel 3

① You sign for a loan with payments of $200 per month at 10% over 10 years compounded monthly. How much money do you get?

$= PV\left(\frac{.01}{12}, \underset{12\cdot 10}{120}, -200\right) = 15134$

Guess: $200 \times 120 = 24000$

3

Panel 4

② You want to setup a trust fund of $50,000 in 17 years at 3% interest compounded monthly with monthly payments of $150. What's the principle to pay initially?

Ball-park it: $150 \times 15 \times 12 = 27000$, so invest ≈ 23000

$= PV\left(\frac{0.03}{12}, 12 \cdot 15, -150, 50000\right) = \$10178$

4

Panel 5

③ You invest $150 per month at 7% compounded monthly for 4 years. How much will you have?

$= FV\left(\frac{0.07}{12}, 4 \cdot 12, -150\right) = 8291$

Guess: $150 \times 4 \times 12 = 7200$

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Panel 6

④ You take out a loan for $20,000 over 5 years at 4% interest compounded monthly. Payments per month?

Guess: $\frac{20000}{60} = \$333.33$

$= PMT\left(\frac{0.04}{12}, 60, -20000\right) = \$368.33$

$368.33 \times 60 = 22099.-$

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Panel 7

Last question: Suppose you want to purchase a house. You need a loan of $200,000 over 30 years. Bank A offers 5%, Bank B offers 4.7%. What is the savings over the life of the loan if you make monthly payments and monthly compoling.

A: $= PMT\left(\frac{0.05}{12}, 30\times 12, -200000\right) = \$1073.64$

total amount bank A gets is $\$1073.64 \times 30 \times 12 = \$386\,510.40$

B: $= PMT\left(\frac{0.047}{12}, 30\times 12, -200000\right) = \$1037.64$

in total: $\$1037.64 \times 30 \times 12 = \$373\,320$

difference is ~13000

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Panel 8

7. Suppose you invest $250 at a nominal interest rate of 7% compounded quarterly.
   a) What is the *effective* rate of interest?
   b) How much is your investment worth after 5 years?
   c) How would you use the *effective* rate to compute the answer for part (b)

a) $r_e = \left(1+\frac{r}{n}\right)^n - 1 = \left(1+\frac{0.07}{4}\right)^4 - 1 = 0.0718$ or 7.18%

b) $S = 250\left(1+\frac{0.07}{4}\right)^{4\cdot 5} = \$353.69$

c) $S = 250\left(1+\frac{0.0718}{1}\right)^5 = \$353.59$

$1060 over 1 year

8

Panel 9

8. Suppose $8,000 is invested in an account. How much money is in the account in 6 years if the interest rate is 5% compounded: a) monthly b) continuously?

a) $S = 8000\left(1+\frac{0.05}{12}\right)^{72} = 10792.$

Recall: $\lim_{n\to\infty}\left(1+\frac{1}{n}\right)^n = e$ $\left(1+\frac{r}{n}\right)^{nt}$ new!

Continuous Compound Interest is: $S = Pe^{rt}$, r = rate, t = # years

b) $S = 8000e^{0.05\cdot 6} = 10798.84$

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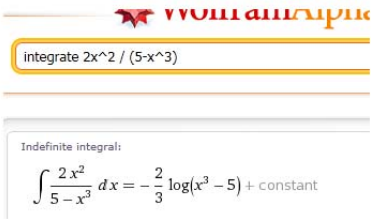
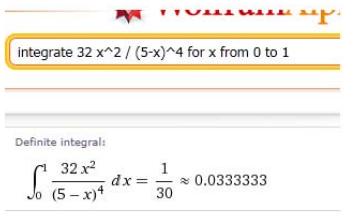
Panel 10





Talk on Copy right!

Richard Stallman

April 19, 2:30-4:30

JH Auditorium

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