## ECS10

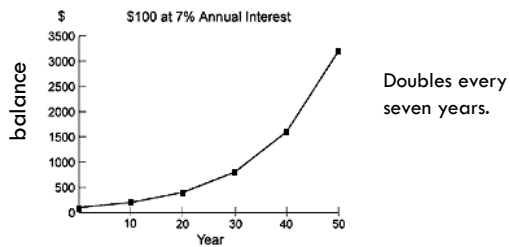## Compound interest

- Say you invest $100 and make 7% annually
- After one year you have:
  $100 + $100*7/100 = $107
  You made $7.00
- If you leave it invested, and make another 7% the next year, you have:
  $107 + $107*7/100 = $114.48
  You made $7.49

## Compound interest

- The more you have the more you make



Doubles every seven years.

## Debt and Payments

- Example debt:
  - Beginning balance $1000
  - Interest rate 13% annually
  - Make a payment of $300 per year
- After one year you owe:
  $1000+ $1000*13/100 = $1130 ($130 in interest)
- Then you pay $300, so you owe $1130-$300 = $870

- The next year, you owe:
  $870 + $870*13/100 = 983.10$ ($113.10 in interest)
- Pay another $300, and get down to $683.10

## New Assignment

- Given a debt amount, interest rate and monthly payment, figure out how long it takes to pay off the debt, and how much you end up paying in interest.

## "Compounded monthly"

- Instead of computing and adding interest every year, do it every month.
- Use interest rate of (13 / 12)% = 1.0833% every month
- Is 13% compounded monthly better than 13% compounded annually? Is it exactly the same?
- We'll write a program to figure this out, using the main technical feature we'll need in the compound interest program — the while loop.

## While loop

- Do a block of statements a bunch of times.
- Stop when something changes.

**while Boolean is True:**

> **Do statements in block**

- **while** loop does block over and over, until the Boolean expression becomes False somehow.

## Infinite loop

- One of the classic programming bugs
- Get out of it using CRTL-c (hold down control key and type c)
- Repeat after me: CRTL-c



## Ways a program can fail

- Crash: gets to a statement Python cannot execute, program stops and prints red error messages.
- Does something, but not what it is supposed to do.
- Infinite loop: gets stuck doing the same thing over and over, will never escape.
- Often when a program "goes away" or "hangs up" it is in an infinite loop.

## EIR program

- Study this program on the course Web page.

## Uglier code, prettier output

- You can ask Python to cut off extra decimal places.

> '{:.2f}'.format( 1.8976437521 )

- format() is a function
- The string describing the specific format is stuck onto the beginning, with the period inbetween
- **The format function produces a string**
- **This is an expression, of type string**

## Challenging Assignment

- If you understand this, you are home free in this course.
- Start the program early. Go to section.
- You may work with a partner on this assignment! Make sure you both understand what is going on.