1 - True or False

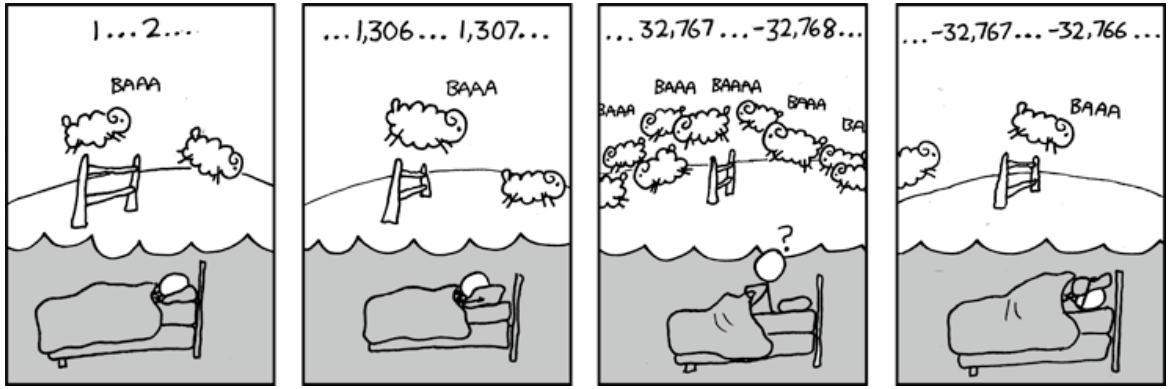
This statement is true for all float numbers: $x^2 \geq 0$

True

False

Great Reality #1:
ints are not Integers, floats are not Reals

- **Example 1: Is $x^2 \geq 0$?**
  - Float's: Yes!



  - Int's:
    - 40000 * 40000 = 1,600,000,000
    - 50000 * 50000 = ??
- **Example 2: Is (x + y) + z = x + (y + z)?**
  - Unsigned & Signed Int's: Yes!
  - Float's:
    - (1e20 + -1e20) + 3.14 --> 3.14
    - 1e20 + (-1e20 + 3.14) --> ??

Source: xkcd.com/571

2 - Quiz

What was the reason of Patriot missile failure?

number overflow

limitations of binary numbers

stack overflow

limitations of floating point numbers

- **Patriot missile failure, Dhahran, 1991**
  - Reason: You cannot represent 1/10 in binary
  - Result: 28 Soldiers dead
  - More at:
    - http://www-users.math.umn.edu/~arnold//disasters/patriot.html

3 - Quiz

Which programming language does not prevent memory referencing errors?

- C
- Java
- Python
- Ruby

Memory Referencing Bug Example

```
typedef struct {
  int a[2];
  double d;
} struct_t;

double fun(int i) {
  struct_t s;
  s.d = 3.14;
  s.a[i] = 1073741824; /* Possibly out of bounds */
  return s.d;
}
```

```
fun(0)   ☞   3.14
fun(1)   ☞   3.14
fun(2)   ☞   3.1399998664856
fun(3)   ☞   2.00000061035156
fun(4)   ☞   3.14
fun(6)   ☞   Segmentation fault
```

In C you will not get array out of bounds exception

- Result is system specific

4 - Quiz

Who designed B programming language

 Dennis Richie

 Steve Jobs

 Linus Torvalds

 Ken Thompson

UNIX

- **Developed in 1969 at Bell Labs**
  - Originally intended for use as a programmer environment for developing multi-platform code and written in Assembly
  - In 1973 it is rewritten in C
  - Then adopted by universities and industry

Ken Thompson (sitting) and Dennis Ritchie working together - Wikipedia.org

- **C as a side product**

  Originally developed at Bell Labs by Dennis Ritchie between 1972 and 1973 to make utilities running on Unix

  First Ken Thompshon developed a new language B, it was slow. Then Richie started to improve B and developed C

5 - Quiz

Which text editor requires graphical user interface?

nano

gedit

vi

emacs

Editing Files with text Editors

Easy to learn

- nano: All help you need is displayed at the bottom of the screen. Do not require graphical environment.
- gedit: look like notepad in windows. Capable, configure able. Requires graphical environment.

Advanced

- Used by developers and administrators
  - vi
  - emacs
- Easily available and compatible
- Steep learning curve, very efficient for programming
- Do not require graphical environment.

6 - Quiz

Which command in Linux prints the current working directory?

- print
- cd
- pwd
- ls

Directory Structure

- **Files are named by naming each containing directory starting at the root**
  - E.g /etc/passwd
  - This is called pathname
- **Current Directory**
  - There is one current working directory
  - If you omit the leading / then path name is relative to the current working directory
  - Use pwd to find out where you are (prints current working directory)

absolute path

passswd relative path

```
cs257@cs257-VirtualBox:/usr/games$ pwd
/usr/games
```

7 - True or False

Linux is case sensitive

True

False

8 - Quiz

Which special file name (symbol) specifies the user home directory

.

..

~

/

Naming

- **Case sEnsItive**
- **Reserved characters: *.|>< and more**
- **Spaces are a pain (use single quotation)**
- **Numbers are allowed, even at the beginning**
- **Special file names**
  - / The root directory (not to be confused with the root user)
  - . The current directory
  - .. The parent (previous) directory
  - ~ My home directory
- **Examples**
  - ./a same as a
  - ../jane/x go one level up then look in directory jane for x

My File

vi 'My File'

\MyFile

cd cd .

cd cd ..

cd ~

9 - Quiz

Which command displays Linux user manual?

- help
- man
- um
- manual

10 - Quiz

Which command is not a built in command of shell?

- cd
- exit
- ls
- pwd

Getting Help

- **For built-in commands: help**
  - Commands that belongs to the shell
    - cd, exit, pwd
- **Everything else: man**
  - man ascii
  - man operator
  - man gcc
  - man man
- **Also use Google!**

help cd | less

man gcc | less

```
[sonmeza@compile ~]$ help pwd
pwd: pwd [-LP]
    Print the name of the current working directory.

    Options:
      -L        print the value of $PWD if it names the current working
        directory
      -P        print the physical directory, without any symbolic links

    By default, `pwd' behaves as if `-L' were specified.

    Exit Status:
    Returns 0 unless an invalid option is given or the current directory
    cannot be read.
```

```
[sonmeza@compile ~]$ man man
MAN(1)                          Manual pager utils                          MAN(1)

NAME
       man - an interface to the on-line reference manuals

SYNOPSIS
       man  [-C  file]  [-d]  [-D]  [--warnings[=warnings]]  [-R encoding] [-L
       locale] [-m system[,...]] [-M path] [-S list]  [-e  extension]  [-i|-I]
       [--regex|--wildcard]   [--names-only]  [-a]  [-u]  [--no-subpages]  [-P
       pager] [-r prompt] [-7] [-E encoding] [--no-hyphenation] [--no-justifi□
       cation]  [-p  string]  [-t]  [-T[device]]  [-H[browser]] [-X[dpi]] [-Z]
       [[section] page ...] ...
```

11 - Quiz

Which command exits vim without saving?

- exit
- quit
- :q
- :wq

vi (visual editor)

- To undo the last modification, use **u** command
- To undo all changes in the current line, use **U** command
- To quit,
  - "**:wq**" write and quit.
  - "**:q**" quit without save.
  - "**:q!**" quit, this is needed if you modify the text and do not want to save.
  - "**ZZ**" quick save.

12 - Quiz

Which command can be used to search a keyword in manual pages?

- apropos
- key
- sk
- find

How to approach

- **First look for the word “sequence” in man pages**

  man –k sequence

  Or

  apropos sequence

- **Find the command that prints numbers in sequence looking at short descriptions**
- **Find the man pages for that specific command and look for the syntax.**

```
cs257@cs257-VirtualBox:~$ seq -w 8 12
08
09
10
11
12
```

13 - Quiz

Which command gives read write execute permission to the owner of file "file"

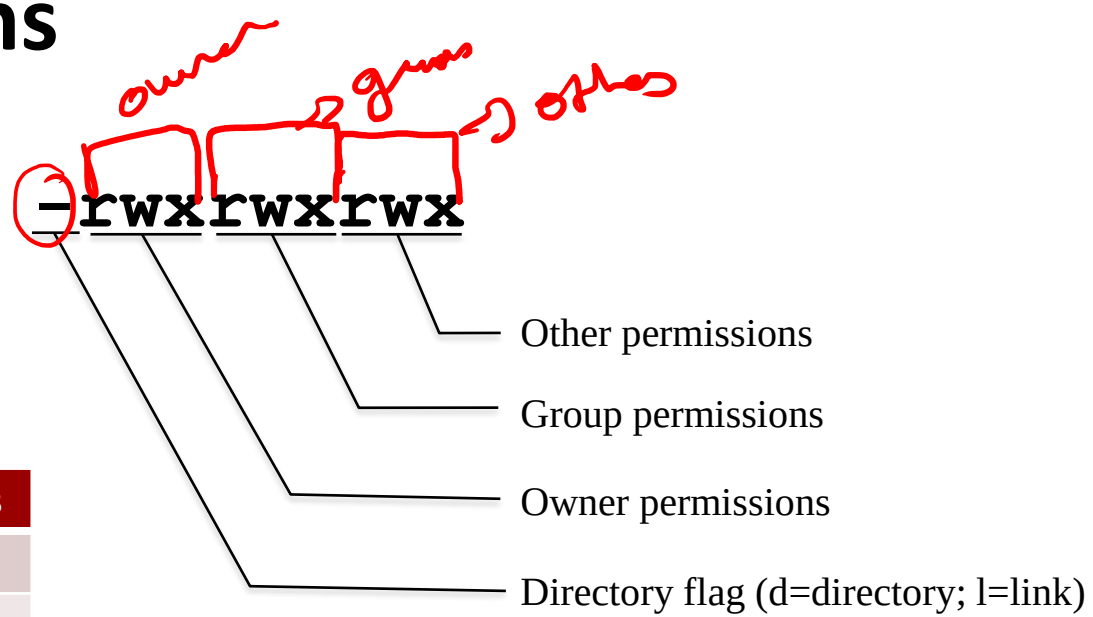
chmod 575 file

chmod 666 file

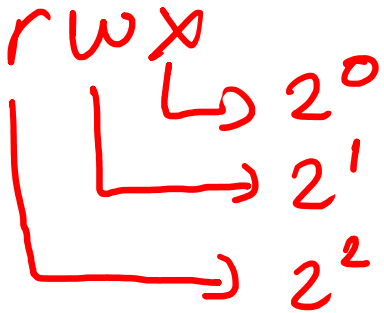
chmod 755 file

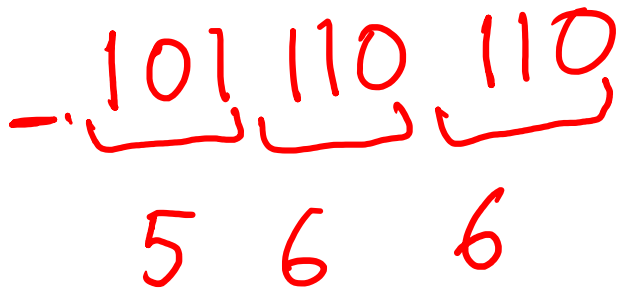
chmod 447 file

File Permissions



Code	Reference to permissions
u	User that owns file
g	Group owners
o	Others
a	All





Changing File Permissions

- `chmod` command to change file permissions
- The permissions are encoded as an octal number

chmod command	Result of executing command
chmod 755 file	Owner=rwx Group=r-x Other=r-x
chmod 500 file2	Owner=r-x Group=--- Other=--
chmod 644 file3	Owner=rw- Group=r-- Other=r--
chmod +x file	Add execute permission to file for all
chmod o-r file	Remove read permission for others
chmod a+w file	Add write permission for everyone

Permission type	Abbreviation	Bit value
Read	r	4
Write	w	2
Execute	x	1