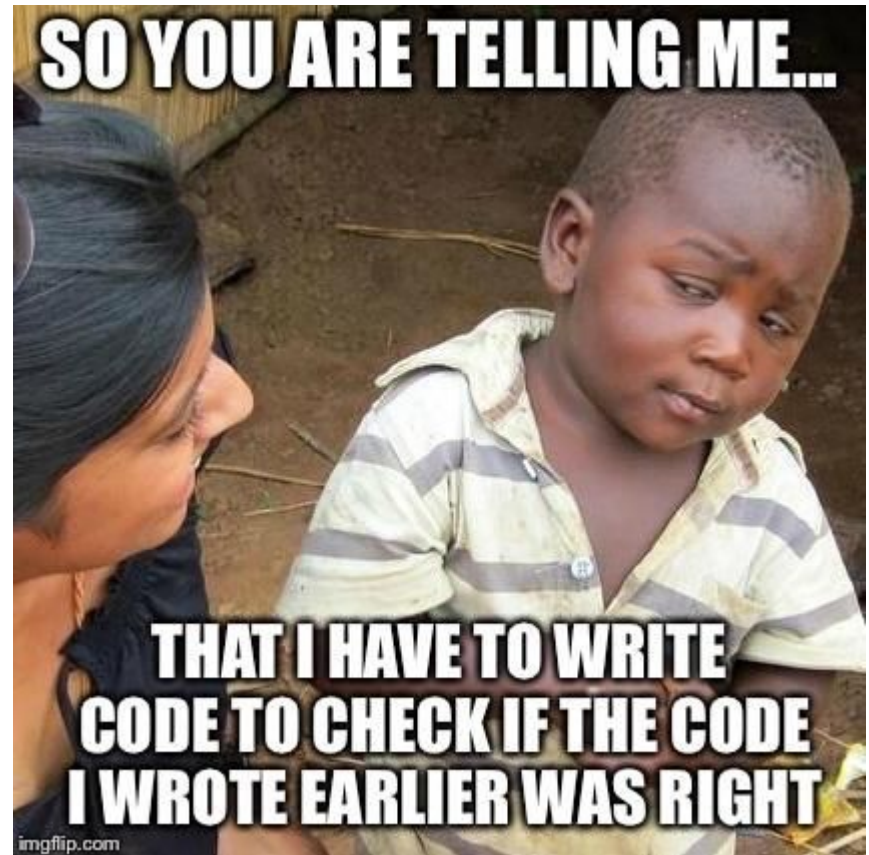


# Code quality

Lecture 7

BIOS 6660, Spring 2019

Instructor: Pam Russell



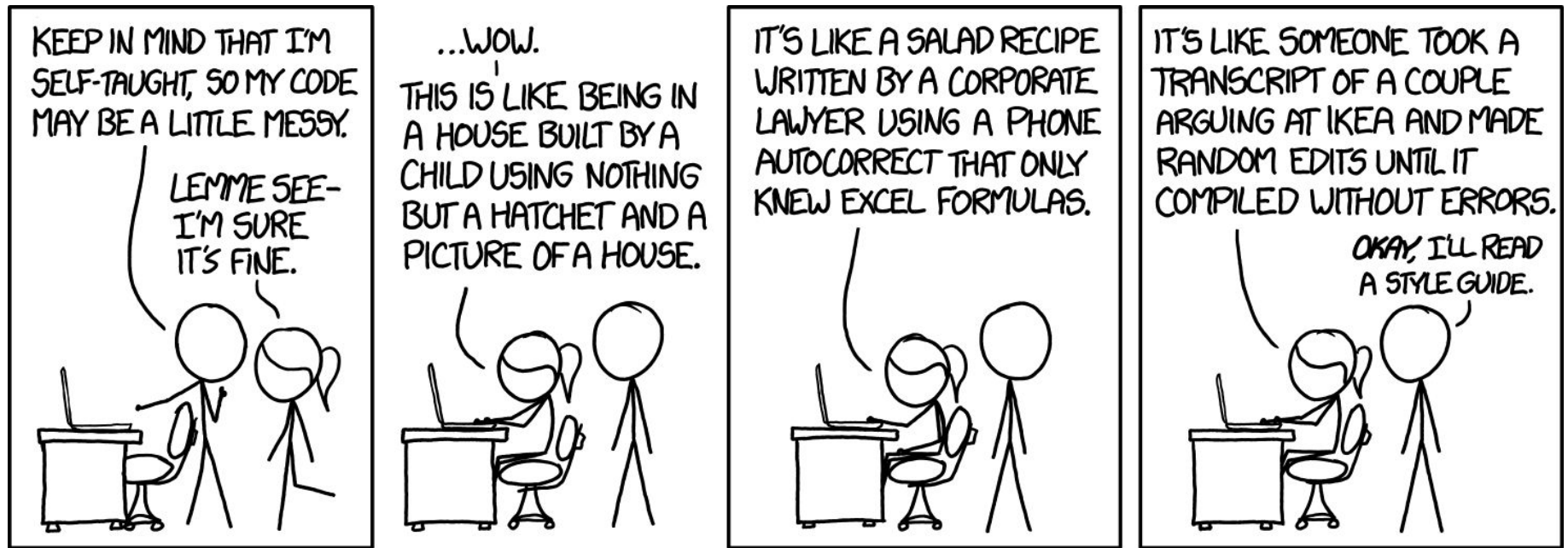
**Homework 3: solution posted later today**

Questions on homework 3?

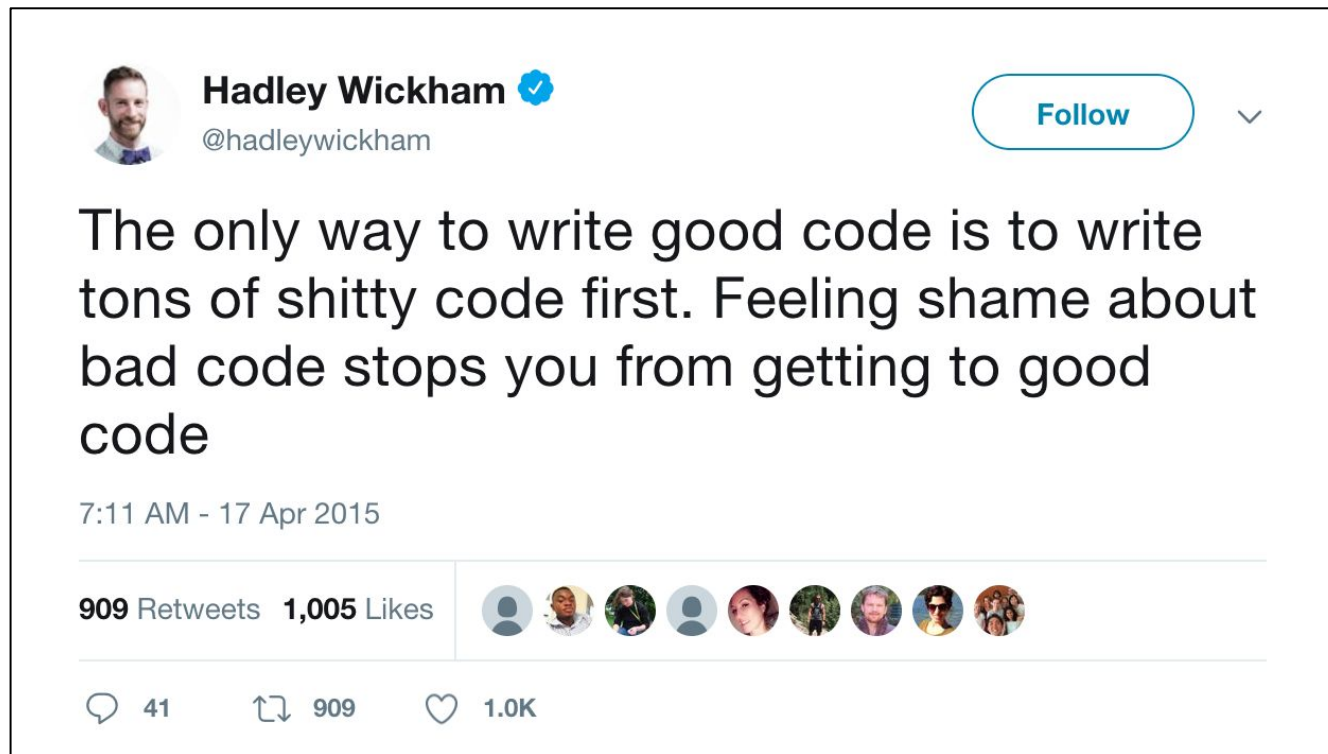
# Homework 4: small analysis project

- Code organization (last week)
- Code quality (today)
- Data management (Thursday)
- Bash scripting (Thursday)

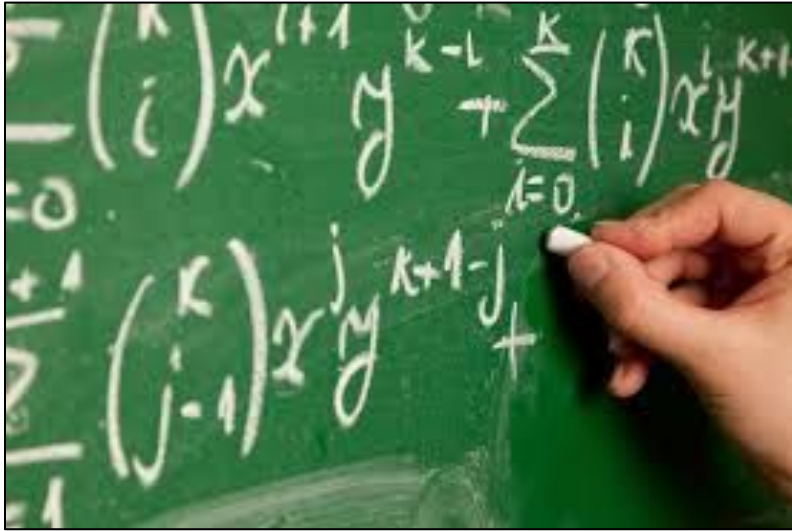
# Code shaming



# Code shaming



# Two aspects of quality



Correctness



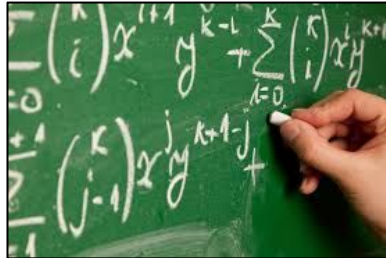
Effective communication

# Code quality dogma

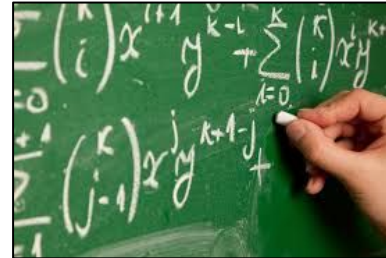
## Practices

## Outcomes

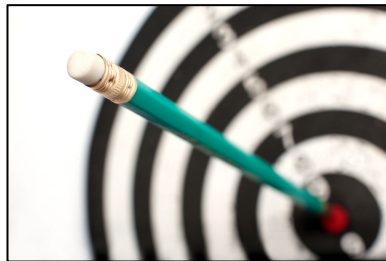
Correctness



Correctness



Effective  
communication



Improved  
quality of life



# Effective communication

“Any fool can write code that a computer can understand.

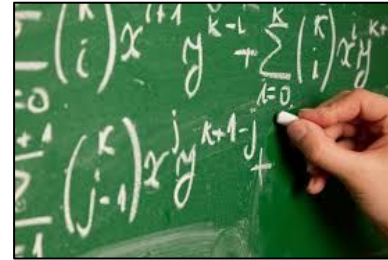
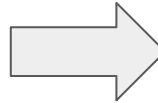
Good programmers write code that humans can understand.”

- Martin Fowler



# Why?

Effective  
communication



Correctness



Improved  
quality of life

- 
- Correctly make changes to code
  - Correctly add to code
  - Fewer bugs
  - More code reuse

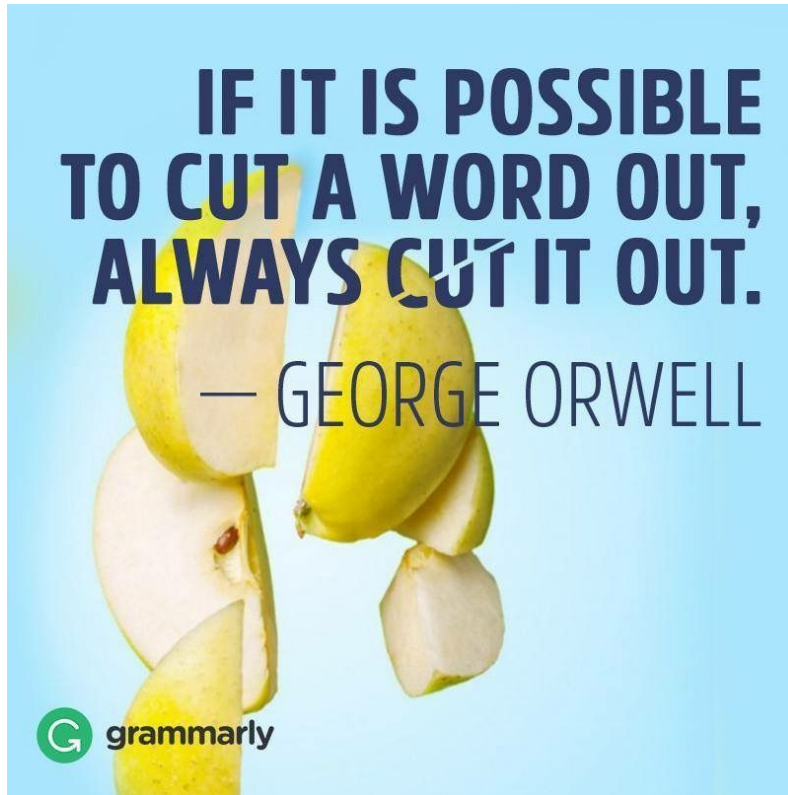
# Communication: already covered

- Consistency of structure
- Consistency of style
- Readability
- Variable naming
- Documentation
- DRY
- Version control

## Variable names continued

People shouldn't have to mentally run your code to figure out what a variable is.

# Variable names: concise, tell the story



Good:

- `speed_mph`
- `file_assoc`
- `num_records`

Bad:

- `speed_in_mph`
- `speed`
- `association_data_file`
- `file`
- `number_of_records`
- `n`

## Special variable name: function return value

```
mixed_ops <- function(int, string, float) {  
  rtn <- list()  
  rtn$elt1 <- int - 5  
  rtn$elt2 <- paste(string, "more text")  
  rtn$elt3 <- sqrt(float)  
  rtn  
}
```

# Documentation: just the right amount

“THIS PORRIDGE IS  
JUST RIGHT”

GOLDBLOCKS ATE  
ALL THE PORRIDGE



# Correctness

For every input, the program produces the expected output.

# Bug

A flaw in a program that causes it to produce incorrect output.



**"First actual case of bug being found"**

9/9

0800 Andean started  
1000 " stopped - andean ✓  
13'00 (032) MP-MC 1.98267000 { 1.2700 9.037847025  
~~2.130476415~~ 9.037846995 correct  
(033) PRO 2 2.130476415  
correct 2.130676415  
Relays 6-2 in 033 failed special speed test  
in Relay " 10.000 test.

Relay 2145  
Relay 3370

1100 Started Relays change  
1525 Started Cosine Tape (Sine check)  
Started Multi Adder Test.

1545

Relay #70 Panel F  
(moth) in relay.

First actual case of bug being found.  
1630 Antark started.  
1700 closed down.

# Signs of a bug in R code

- You notice that the output is wrong
- A warning is printed
- An error is printed and program crashes
- A test fails (more on this soon)

# Debugging and testing

L7\_debugging\_testing.html