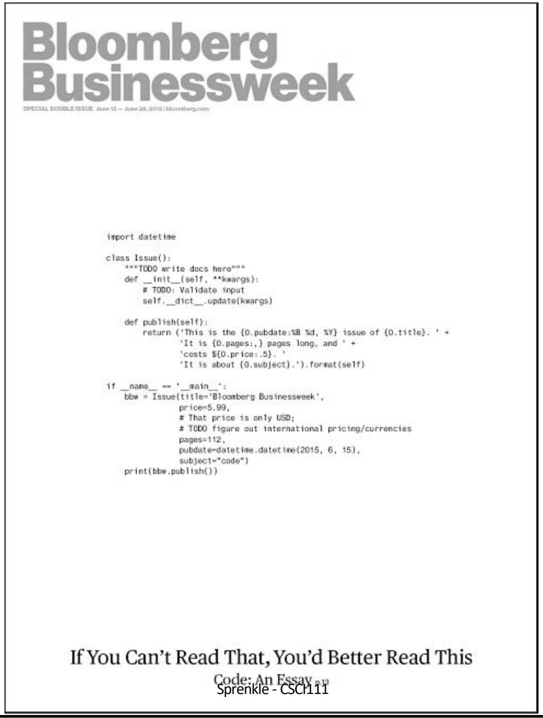
CSCI111: Fundamentals of Programming I

Professor Sprenkle
sprenkles@wlu.edu
http://cs.wlu.edu/~sprenkle/cs111



Bloomberg Businessweek

SPECIAL DOUBLE ISSUE June 15 — June 28, 2015 | bloomberg.com

```
import datetime

class Issue():
    """TODO write docs here"""
    def __init__(self, **kwargs):
        # TODO: Validate input
        self.__dict__.update(kwargs)

    def publish(self):
        return ('This is the {0.pubdate:%B %d, %Y} issue of {0.title}. ' +
                'It is {0.pages:,} pages long, and ' +
                'costs ${0.price:.5}. '
                'It is about {0.subject}.').format(self)

if __name__ == '__main__':
    bbw = Issue(title='Bloomberg Businessweek',
                price=5.99,
                # That price is only USD;
                # TODO figure out international pricing/currencies
                pages=112,
                pubdate=datetime.datetime(2015, 6, 15),
                subject="code")
    print(bbw.publish())
```

If You Can't Read That, You'd Better Read This

Code: An Essay p.11

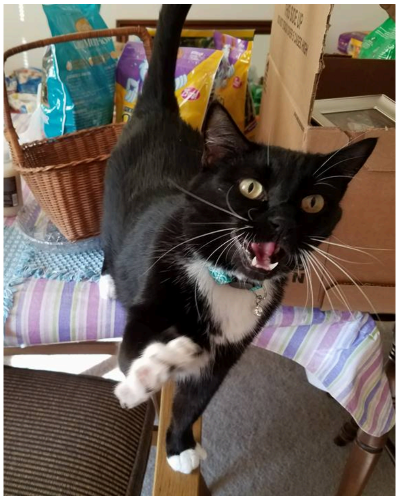
My Bio

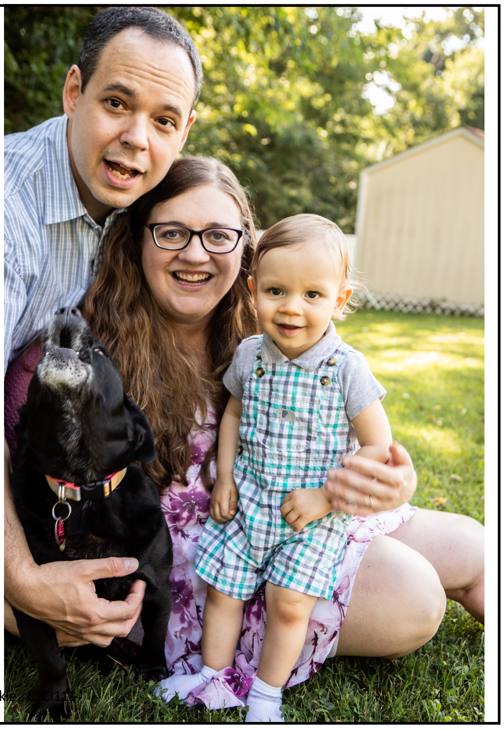
- From Dallastown, PA
- Education: B.S., Gettysburg College; M.S., Duke University; Ph.D., University of Delaware
- For fun: pop culture, gardening, Rockbridge Animal Alliance

December 2020

October 2019

My Roommates





Survey Says…

- What year are you?
- Who has used a computer regularly?
- Who has used the Internet regularly?
- Who has made a web page?
- Who has written a program?
- Why are you taking this course?

What is Computer Science?

> “Computer Science is no more about computers than astronomy is about telescopes.”
> --Edsger Dijkstra

- CS = Complexity Science

Jeannette Wing

- Microsoft VP of Research
- Formerly at NSF, CMU

When people talk about the smart grid, smart vehicles, and smart buildings — what makes them '*smart*'?
Computer science.
When people talk about personalized medicine and personalized learning, how do you think personalization is possible?
Computer science.

We're not there yet, but the next generation of computer scientists can help us realize these visions — with immeasurable *benefits* to *society* and the *economy*.

`http://www.nytimes.com/roomfordebate/2011/06/15/computer-sciences-sputnik-moment/writing-code-has-become-self-expression`

(emphasis is mine)

CS == Complexity Science
or the Study of Complexity

- How can it be done?
    - Based on **information**
    - Managing, manipulating data
    - Possible algorithms
- How well can it be done?
    - Most **efficient** algorithm in terms of time and/or space
- Can it be done at all?
    - Often, proof is a program--an implementation of the above

Computer Science Fields

Systems

- Architecture
- Operating systems
- Networks
- Distributed and parallel systems
- Databases
- …

Software

- Compilers
- Graphics
- Software engineering
- Software testing and verification,
- …

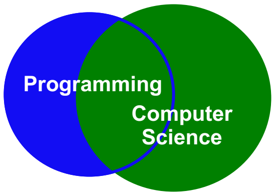
Theory

- Algorithms
- Theory of computation
- …

Other

- Artificial intelligence
- Robotics
- Natural language processing
- Bioinformatics
- Visualization
- Data science
- …

- Often research involves combinations of these fields
- Not just programming!
  - But programming is a tool to do much, much more!

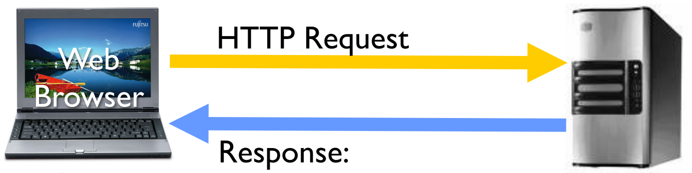


What I do **not** do as a Computer Scientist

- Fix hardware
- Fix Microsoft Windows (or other operating systems) problems
- Fix Microsoft Office (or other desktop applications) problems

What I Do as a Computer Scientist

- Interests: Software testing, empirical studies, distributed systems
- Focus: Automated web application testing



Web Browser

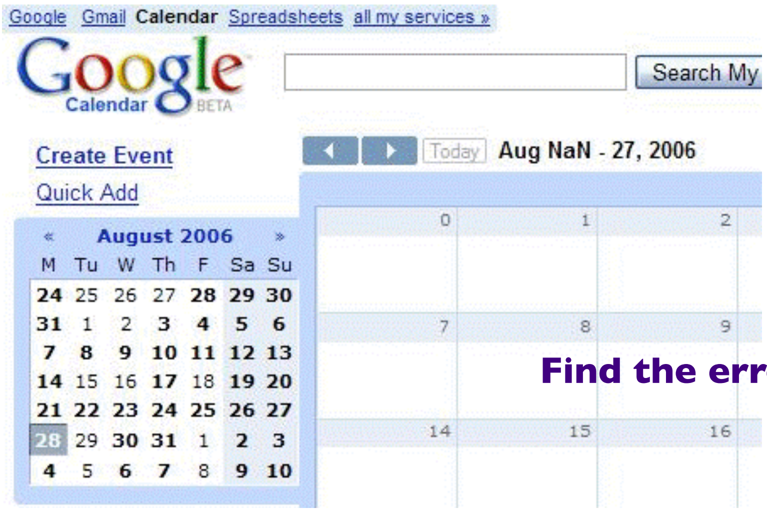
HTTP Request

Response:
HTML Document

Client

Web Application Server

What I Do as a Computer Scientist


Google Gmail Calendar Spreadsheets all my services »
Google Calendar BETA
Search My
Today
0
1
2
7
8
9
14
15
16

Create Event

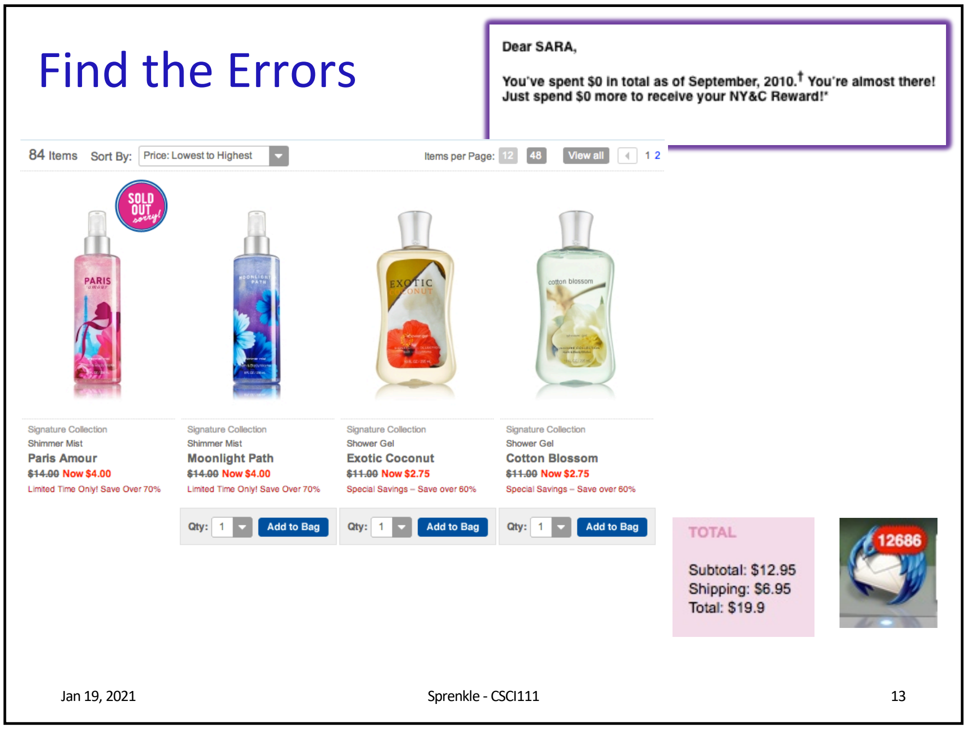
Quick Add

Aug NaN - 27, 2006

« August 2006 »

M	Tu	W	Th	F	Sa	Su
24	25	26	27	28	29	30
31	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	1	2	3
4	5	6	7	8	9	10

Find the error(s)!



Find the Errors

Dear SARA,

You've spent $0 in total as of September, 2010.† You're almost there!
Just spend $0 more to receive your NY&C Reward!*

84 Items Sort By: Price: Lowest to Highest

Items per Page: 12 48 View all 1 2

Signature Collection
Shimmer Mist
Paris Amour
~~$14.00~~ Now $4.00
Limited Time Only! Save Over 70%

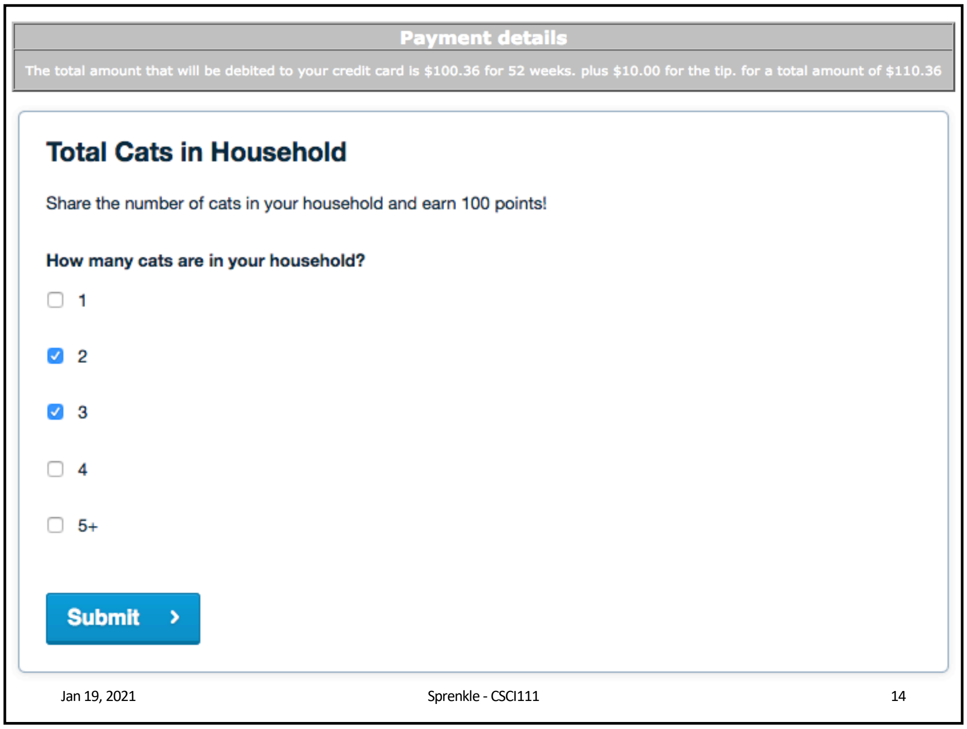
Signature Collection
Shimmer Mist
Moonlight Path
~~$14.00~~ Now $4.00
Limited Time Only! Save Over 70%

Signature Collection
Shower Gel
Exotic Coconut
~~$11.00~~ Now $2.75
Special Savings – Save over 60%

Signature Collection
Shower Gel
Cotton Blossom
~~$11.00~~ Now $2.75
Special Savings – Save over 60%

TOTAL

Subtotal: $12.95
Shipping: $6.95
Total: $19.9



Payment details

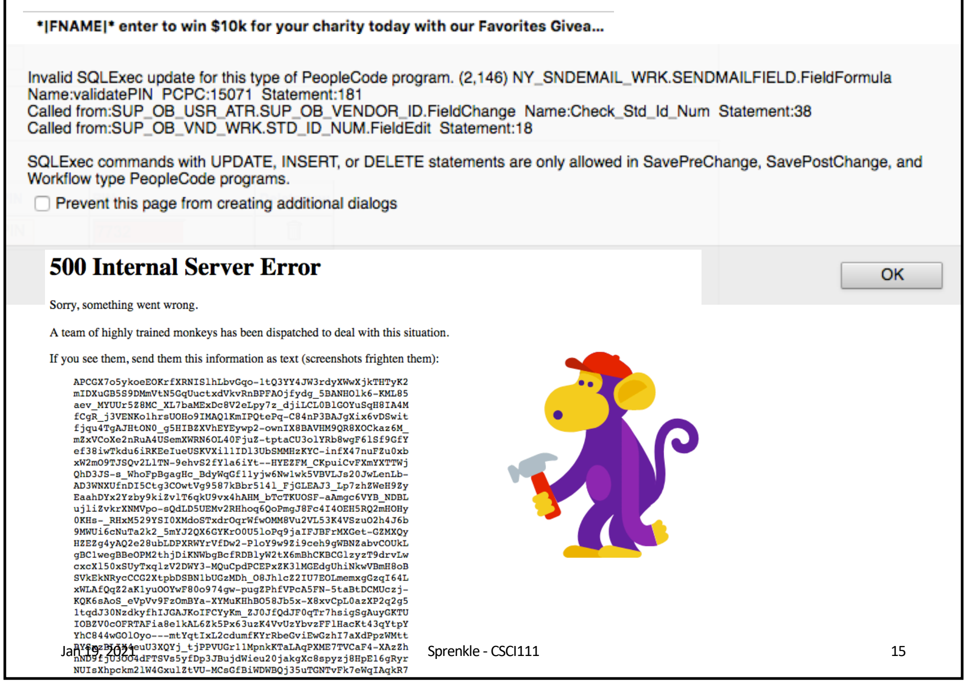
The total amount that will be debited to your credit card is $100.36 for 52 weeks. plus $10.00 for the tip. for a total amount of $110.36

Total Cats in Household

Share the number of cats in your household and earn 100 points!

How many cats are in your household?

☐ 1
☑ 2
☑ 3
☐ 4
☐ 5+



***|FNAME|* enter to win $10k for your charity today with our Favorites Givea...**

Invalid SQLExec update for this type of PeopleCode program. (2,146) NY_SNDEMAIL_WRK.SENDMAILFIELD.FieldFormula Name:validatePIN PCPC:15071 Statement:181
Called from:SUP_OB_USR_ATR.SUP_OB_VENDOR_ID.FieldChange Name:Check_Std_Id_Num Statement:38
Called from:SUP_OB_VND_WRK.STD_ID_NUM.FieldEdit Statement:18

SQLExec commands with UPDATE, INSERT, or DELETE statements are only allowed in SavePreChange, SavePostChange, and Workflow type PeopleCode programs.

☐ Prevent this page from creating additional dialogs

500 Internal Server Error

Sorry, something went wrong.

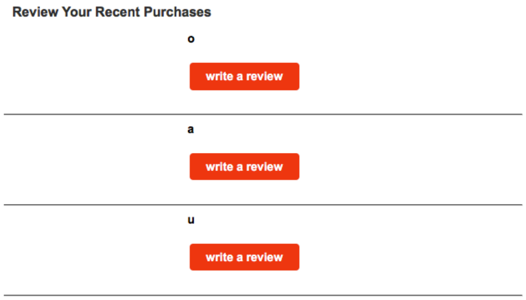
A team of highly trained monkeys has been dispatched to deal with this situation.

If you see them, send them this information as text (screenshots frighten them):

```
APCGX7o5ykoeEOKrfXRNISlhLbvGqo-ltQ3YY4JW3rdyXWwXjkTHTyK2
mIDXuGB5S9DMmVtN5GqUuctxdVkvRnBPFAOjfydg_5BANHOlk6-KML85
aev_MYUUr5Z8MC_XL7baMExDc8V2eLpy7z_djiLCL0BlGOYuSqH8IA4M
fCgR_j3VENKolhrsUOHo9IMAQlKmIPQtePq-C84nP3BAJgXix6vDSwit
fjqu4TgAJHtON0_g5HIBZXVhEYEywp2-ownIX8BAVHM9QR8XOCkaz6M_
mZxVCoXe2nRuA4USemXWRN6OL40FjuZ-tptaCU3olYRb8wgF6lSf9GfY
ef38iwTkdu6iRKEeIueUSKVXillIDl3UbSMMHzKYC-infX47nuFZu0xb
xW2mO9TJSQv2LlTN-9ehvS2fYla6iYt--HYEZFM_CKpuiCvFXmYXTTWj
QhD3JS-s_WhoFpBgagHc_BdyWqGfllyjw6Nwlwk5VBVLJs20JwLenLb-
AD3WNXUfnDI5Ctg3COwtVg9587kBbr514l_FjGLEAJ3_Lp7zhZWeH9Zy
EaahDYx2Yzby9kiZvlT6qkU9vx4hAHM_bTcTKUOSF-aAmgc6VYB_NDBL
ujliZvkrXNMVpo-sQdLD5UEMv2RHhoq6QoPmgJ8Fc4I4OEH5RQ2mHOHy
0KHs-_RHxM529YSI0XMdoSTxdrOqrWfwOMM8Vu2VL53K4VSzuO2h4J6b
9MWUi6cNuTa2k2_5mYJ2QX6GYKrO0U5loPq9jaIFJBFrMXGet-GZMXQy
HZEZg4yAQ2e28ubLDPXRWYrVfDw2-PloY9w9Zi9ceh9gWBNZabvCOUkL
gBClwegBBeOPM2thjDiKNWbgBcfRDBlyW2tX6mBhCKBCGlzyzT9drvLw
cxcXl50xSUyTxqlzV2DWY3-MQuCpdPCEPxZK3lMGEdgUhiNkwVBmH8oB
SVkEkNRycCCG2XtpbDSBNlbUGzMDh_O8JhlcZ2IU7EOLmemxgGzqI64L
xWLAfQqZ2aKlyuOOYwF80o974gw-pugZPhfVPcA5FN-5taBtDCMUczj-
KQK6sAoS_eVpVv9FzOmBYa-XYMuKHhBO58Jb5x-X8xvCpL0azXP2q2g5
ltqdJ30NzdkyfhIJGAJKoIFCYyKm_ZJ0JfQdJF0qTr7hsigSgAuyGKTU
IOBZV0cOFRTAFia8elkAL6Zk5Px63uzK4VvUzYbvzFFlHacKt43qYtpY
YhC844wGOlOyo---mtYqtIxL2cdumfKYrRbeGviEwGzhI7aXdPpzWMtt
BY6mzBLIX4euU3XQYj_tjPPVUGrllMpnkKTaLAqPXME7TVCaF4-XAzZh
nND9fjU3OO4dFTSVs5yfDp3JBujdWieu20jakgXc8spyzj8HpEl6gRyr
NUIsXhpckm2lW4GxulZtVU-MCsGfBiWDWBQj35uTGNTvFk7eWqIAqkR7
```

My Research Interests

- Emails

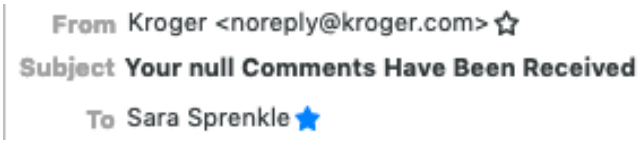


Review Your Recent Purchases

o

a

u

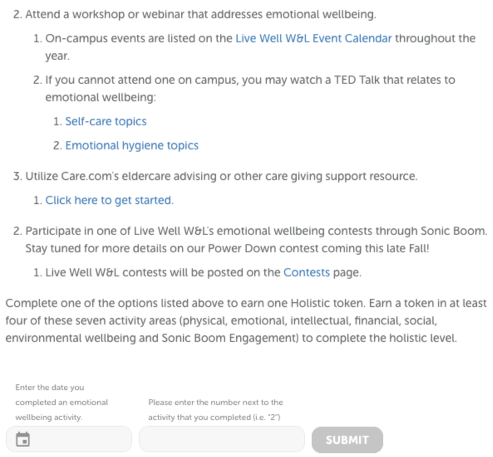


From Kroger <noreply@kroger.com> ☆

Subject **Your null Comments Have Been Received**

To Sara Sprenkle ★

My Research Interests



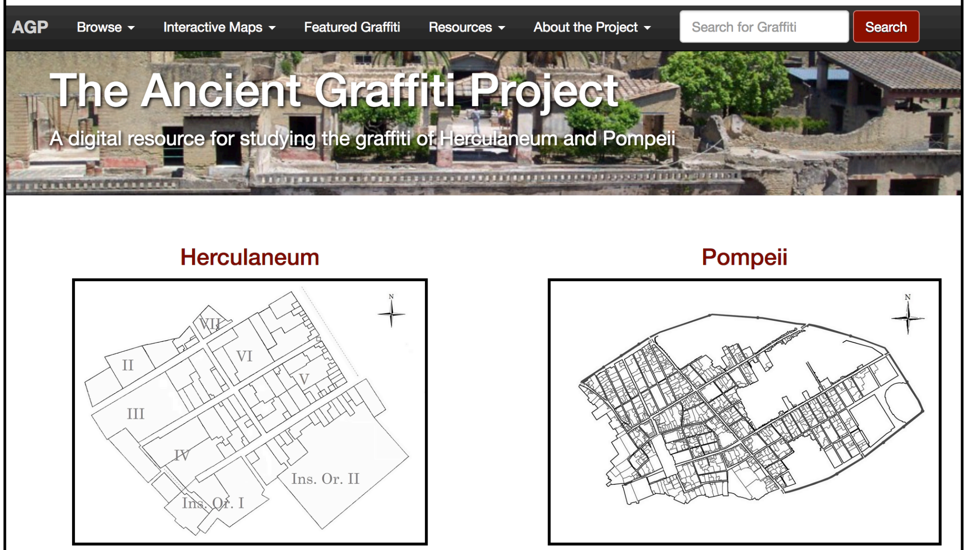
2. Attend a workshop or webinar that addresses emotional wellbeing.
    1. On-campus events are listed on the Live Well W&L Event Calendar throughout the year.
    2. If you cannot attend one on campus, you may watch a TED Talk that relates to emotional wellbeing:
        1. Self-care topics
        2. Emotional hygiene topics
3. Utilize Care.com's eldercare advising or other care giving support resource.
    1. Click here to get started.
2. Participate in one of Live Well W&L's emotional wellbeing contests through Sonic Boom. Stay tuned for more details on our Power Down contest coming this late Fall!
    1. Live Well W&L contests will be posted on the Contests page.

Complete one of the options listed above to earn one Holistic token. Earn a token in at least four of these seven activity areas (physical, emotional, intellectual, financial, social, environmental wellbeing and Sonic Boom Engagement) to complete the holistic level.

Enter the date you completed an emotional wellbeing activity.

Please enter the number next to the activity that you completed (i.e. "2")

Digital Humanities


AGP
Browse
Interactive Maps
Featured Graffiti
Resources
About the Project
Search for Graffiti
Search
N
II
VII
VI
V
III
IV
Ins. Or. I
Ins. Or. II
N

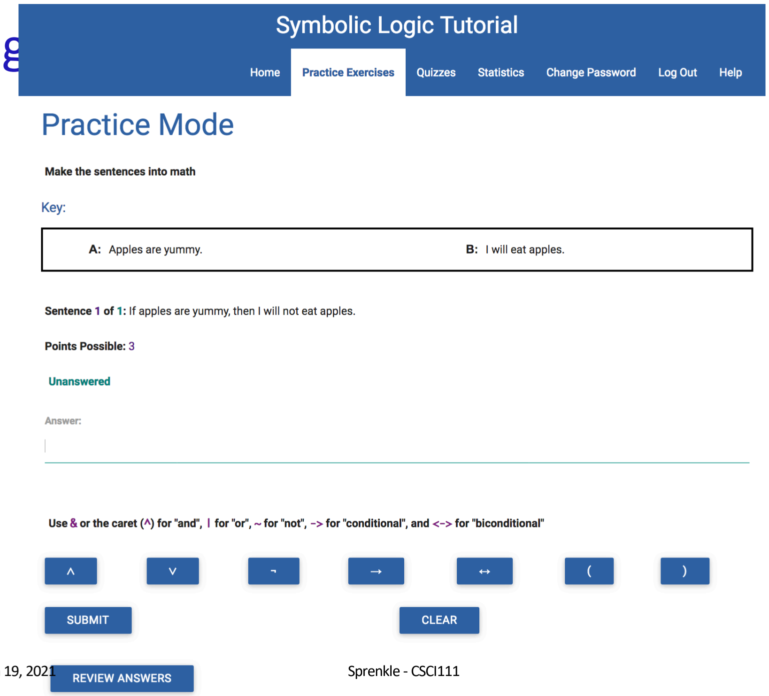
The Ancient Graffiti Project

A digital resource for studying the graffiti of Herculaneum and Pompeii

Herculaneum

Pompeii

Dig


Symbolic Logic Tutorial
Home
Practice Exercises
Quizzes
Statistics
Change Password
Log Out
Help
∧
∨
¬
→
↔
(
)
SUBMIT
CLEAR
REVIEW ANSWERS

Practice Mode

Make the sentences into math

Key:

A: Apples are yummy.	**B:** I will eat apples.

Sentence 1 of 1: If apples are yummy, then I will not eat apples.

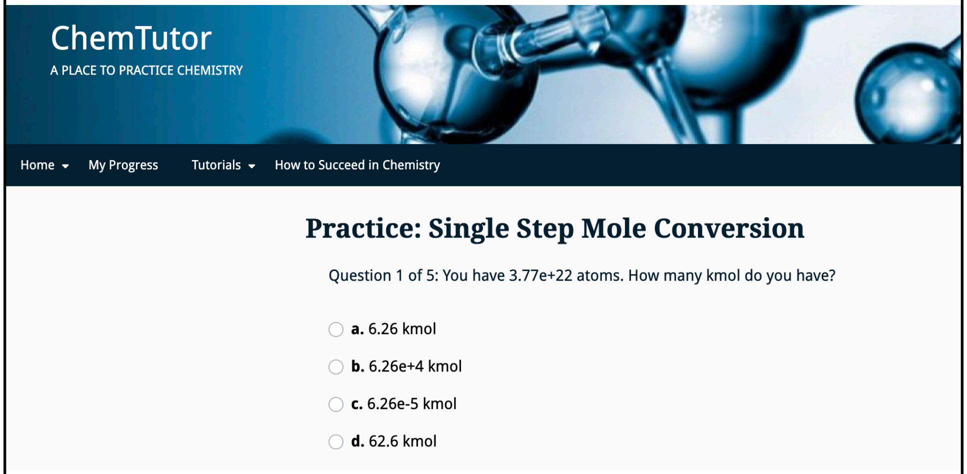
Points Possible: 3

Unanswered

Answer:

Use & or the caret (^) for "and", | for "or", ~ for "not", -> for "conditional", and <-> for "biconditional"

ChemTutor


ChemTutor
A PLACE TO PRACTICE CHEMISTRY
Home
My Progress
Tutorials
How to Succeed in Chemistry

Practice: Single Step Mole Conversion

Question 1 of 5: You have 3.77e+22 atoms. How many kmol do you have?

○ **a.** 6.26 kmol

○ **b.** 6.26e+4 kmol

○ **c.** 6.26e-5 kmol

○ **d.** 62.6 kmol

MEET SOME MORE COMPUTER SCIENTISTS

W&L Alumni at amazon

Software Engineers

Jamie White ‘17

Alex Cantrell ‘19

Student Assistant Rinn Joireman heads to Amazon this fall!

Patrick Ozark ‘17

Bioinformatician at
St. Jude Children's Research Hospital

PhD Students

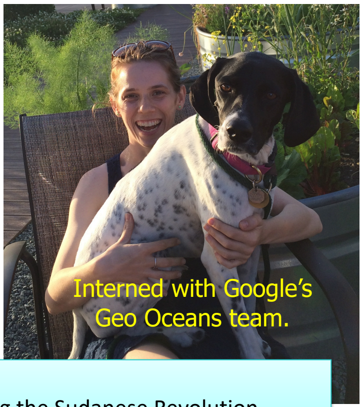
Hammad Ahmad ‘19
Michigan: Software Engineering

Sarah Anne Troise ‘19
CMU: Engineering and Public Policy

Lucy Simko '11 and Camille Cobb '12

Worked for the Dept of Defense on Cybersecurity

SECURITY & PRIVACY
RESEARCH LAB
UNIVERSITY of WASHINGTON



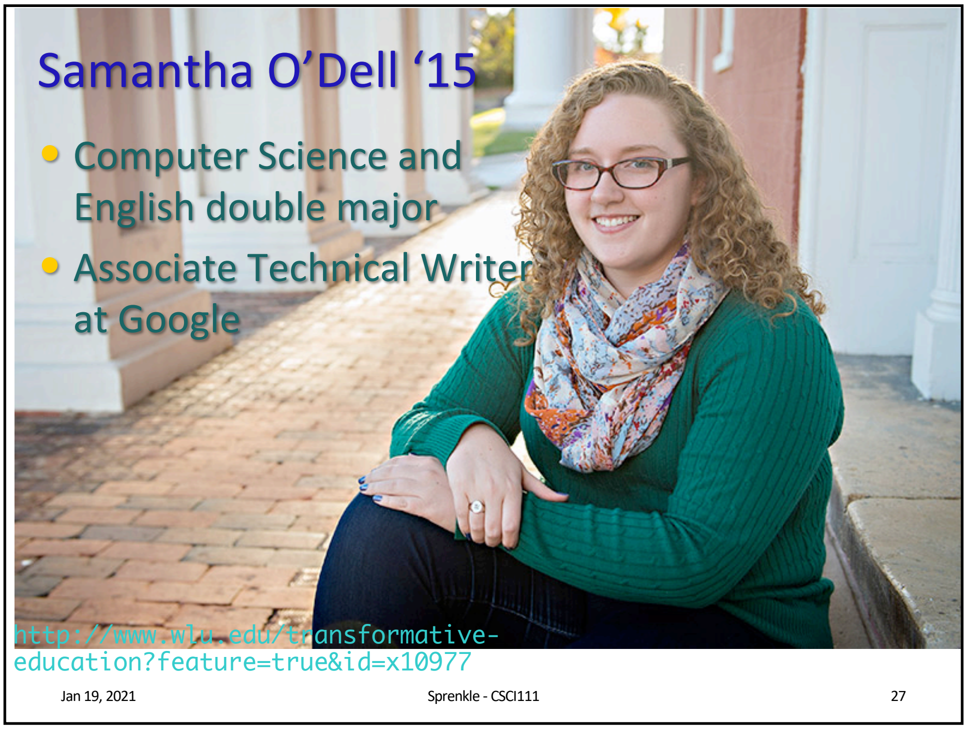
Interned with Google's Geo Oceans team.

Example publications:
- Defensive Technology Use by Political Activists During the Sudanese Revolution
- What Makes People Install a COVID-19 Contact-Tracing App?

Computer Science and Law

Christyann Pulliam
- CS and Political Science major
- Law Degree - Wake Forest
- Patent Examiner at the US Patent and Trademark Office
  - Focus: Search engines, DB apps

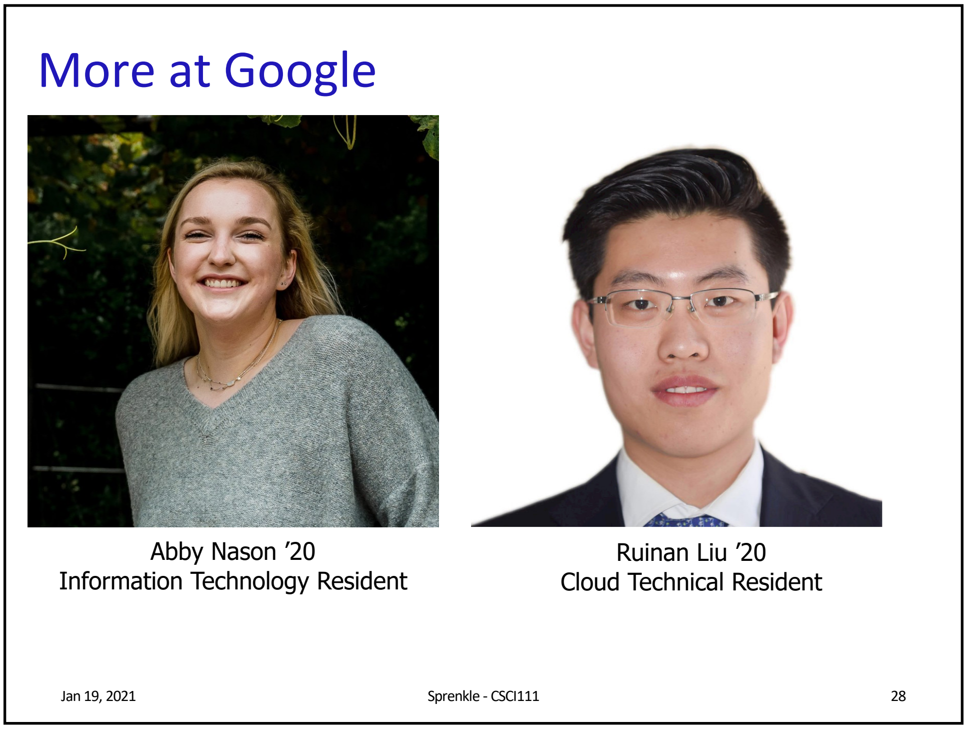
Julianne Campbell '18
- Computer Science Major
- Law Degree - Vanderbilt
- IP Law focus



Samantha O’Dell ‘15

- Computer Science and English double major
- Associate Technical Writer at Google

http://www.wlu.edu/transformative-education?feature=true&id=x10977



More at Google

Abby Nason ’20
Information Technology Resident

Ruinan Liu ’20
Cloud Technical Resident

Lex McGriff ‘18

- Digital Tech Senior Program Analyst, in Jacksonville, FL
- Interned with J.P. Morgan Chase
- CoFounder and President of Be The Difference, Inc.
    - make unique economic, social, and academic contributions to our community

https://www.bethedifferenceinc.org/

Erich Geist FEEDING AMERICA food banks

We use data analytics, computer systems, servers, programming, network and database administration all the time to provide the data necessary to inform our donors, government officials, advocates, and the general public about our mission to feed the hungry.

Without good computer science…there is no food.

Personal Correspondence

Your Bios

- Where you’re from
- Your year
- A fun fact

Hilary Mason

- Founder of Fast Forward Labs
  - a machine intelligence research company
- Formerly Chief Scientist at bitly.
- “Teaching someone to program is like giving them a **superpower**.” quote in *Glamour*, November 2011

What This Course Is About

Problem Solving!

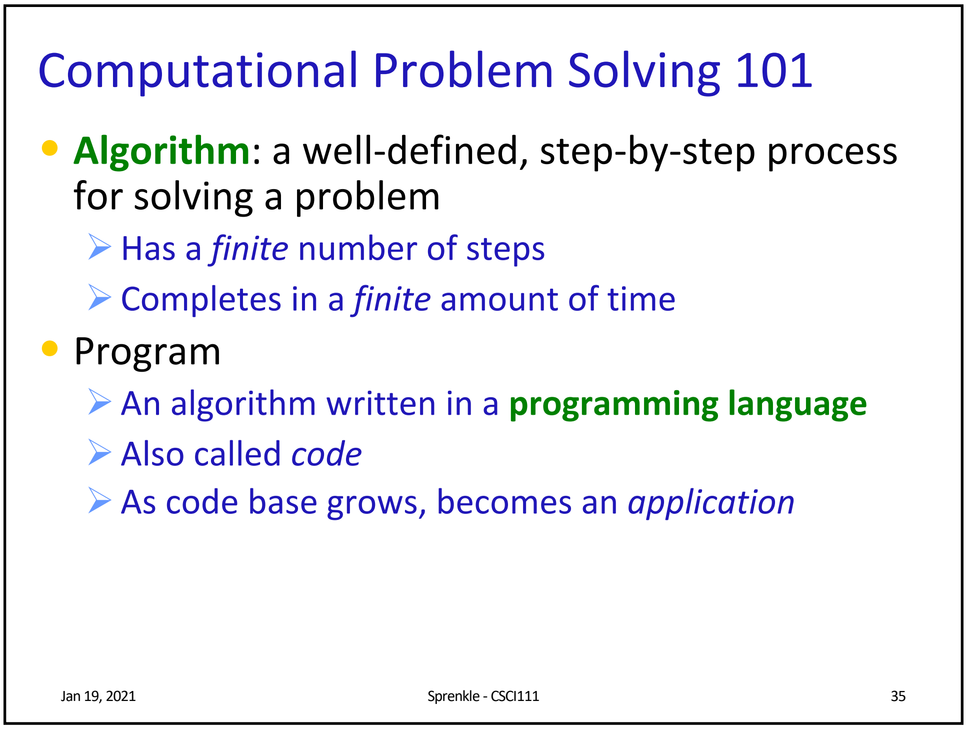
SOLVERS
THE PROBLEM
SOLVERS
THE PROBLEM

From *30 Rock*

Computational Problem Solving 101

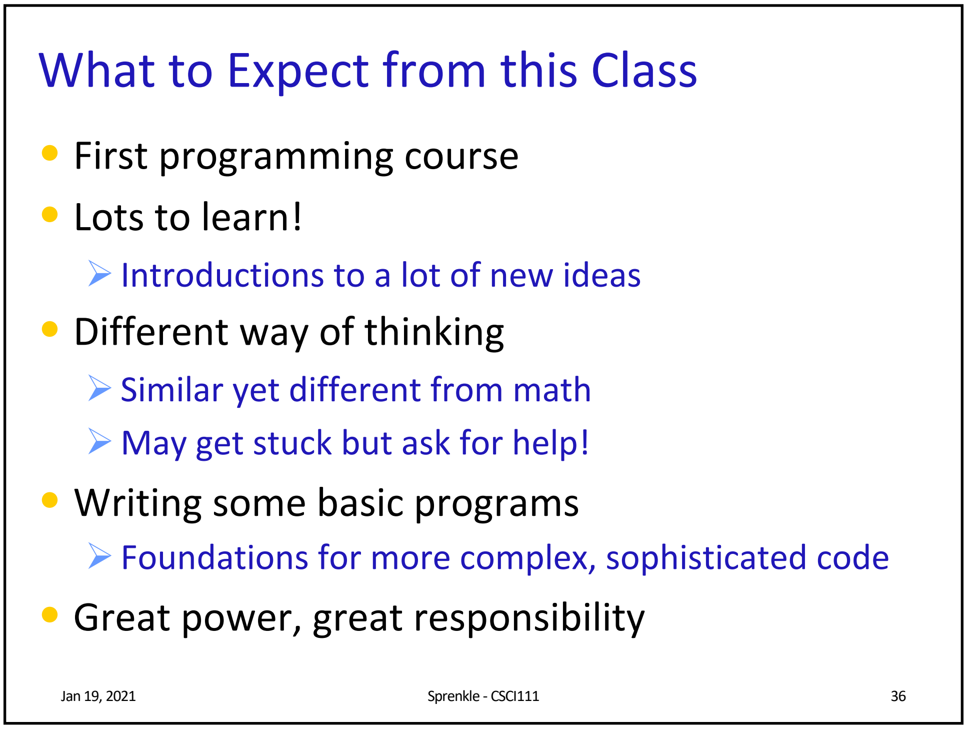
- **Computational Problem**:
  A problem that can be solved by logic
- To solve the problem:
  1. Create a **model** of the problem
  2. Design an **algorithm** for solving the problem using the model
  3. Write a **program** that *implements* the algorithm

THE PROBLEM
THE PROBLEM



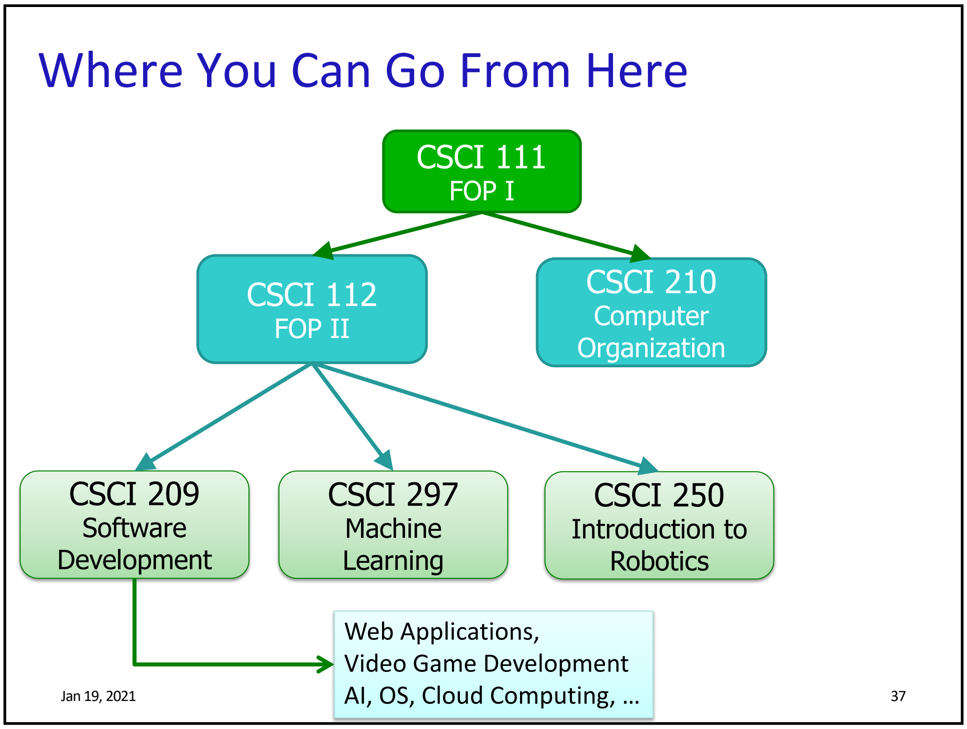
Computational Problem Solving 101

- **Algorithm**: a well-defined, step-by-step process for solving a problem
  - Has a *finite* number of steps
  - Completes in a *finite* amount of time
- Program
  - An algorithm written in a **programming language**
  - Also called *code*
  - As code base grows, becomes an *application*



What to Expect from this Class

- First programming course
- Lots to learn!
  - Introductions to a lot of new ideas
- Different way of thinking
  - Similar yet different from math
  - May get stuck but ask for help!
- Writing some basic programs
  - Foundations for more complex, sophisticated code
- Great power, great responsibility



Where You Can Go From Here

CSCI 111
FOP I

CSCI 112
FOP II

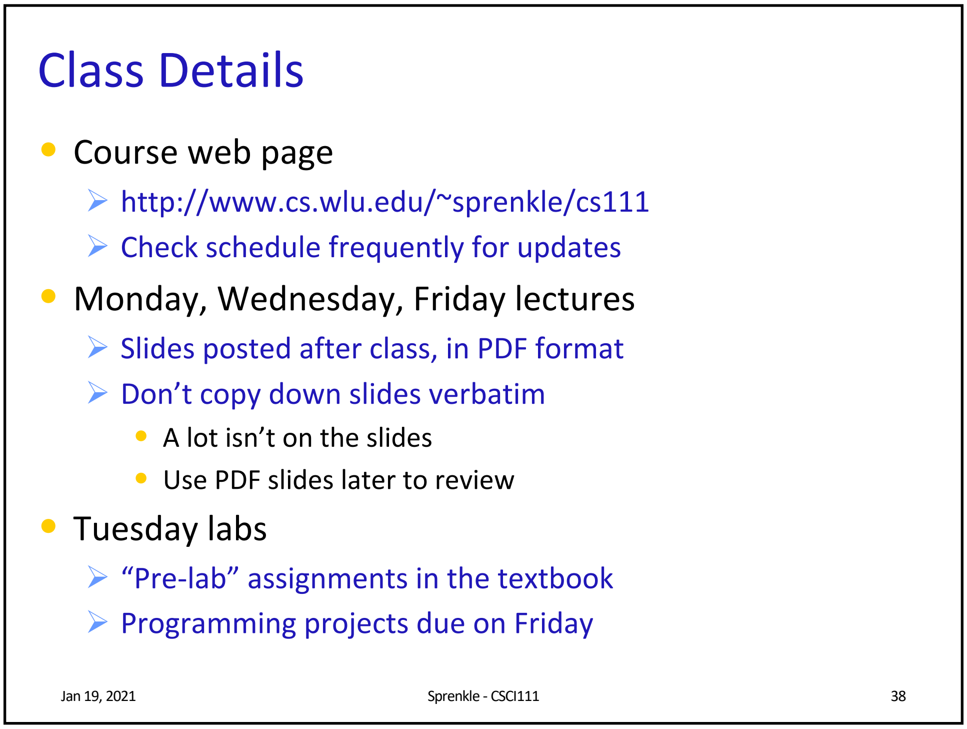
CSCI 210
Computer Organization

CSCI 209
Software Development

CSCI 297
Machine Learning

CSCI 250
Introduction to Robotics

Web Applications,
Video Game Development
AI, OS, Cloud Computing, …



Class Details

- Course web page
  - http://www.cs.wlu.edu/~sprenkle/cs111
  - Check schedule frequently for updates
- Monday, Wednesday, Friday lectures
  - Slides posted after class, in PDF format
  - Don’t copy down slides verbatim
    - A lot isn’t on the slides
    - Use PDF slides later to review
- Tuesday labs
  - “Pre-lab” assignments in the textbook
  - Programming projects due on Friday

Class Details

- 3 Exams
    - 2 Exams (see schedule online for dates)
    - Final Exam
- Discussion of broader issues in CS
    - Articles about computer science’s effect on *everything*
        - Get big picture of CS
    - Write up on Sakai, due Fridays by 11 a.m.
    - Discussion Friday
    - Opportunities for extra credit for finding, reading, summarizing additional articles

Instructor Responsibilities

- Keep your interest in CS
- Prompt, constructive feedback on assignments
- Office hours:
    - Wednesday 3:35 – 4:05 p.m., Thursday: 2:30-4 p.m.
    - Email for appointments
- Respond within 24 hours to emailed questions

Student Responsibilities

- Check W&L email and course web page frequently for updates
  - Review entire syllabus online
- Attend and participate in class and lecture
  - Mandatory attendance
  - Be respectful to other students
- Arrive promptly to lecture/lab
  - Bring your notes and handouts
- Turn off cell phone
- **Be patient, flexible, and learn from mistakes**

Textbook

- Online textbook
- Supplement to the material
  - Different perspective, additional practice problems
- Register for the class (instructions on course schedule page)

Consequence: my lecture slides and handouts and your notes are vitally important

- Reference *frequently*
- **Bring with you to lab!**