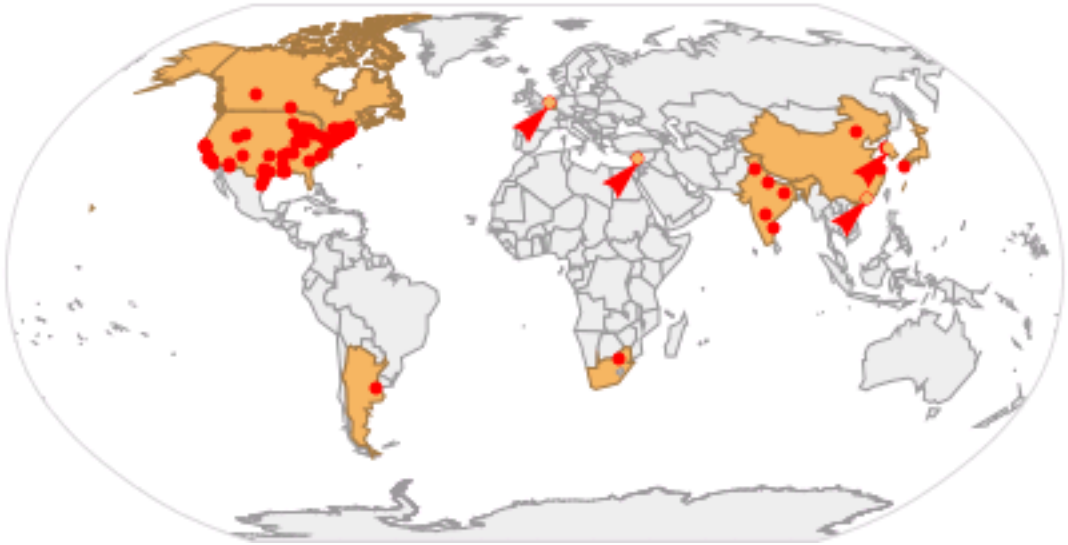
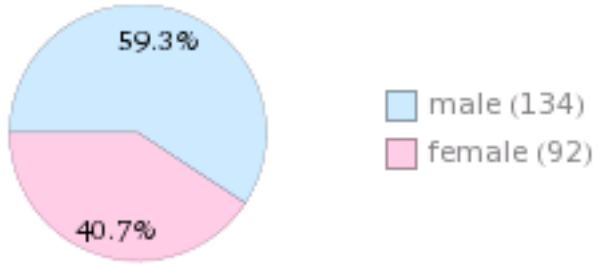
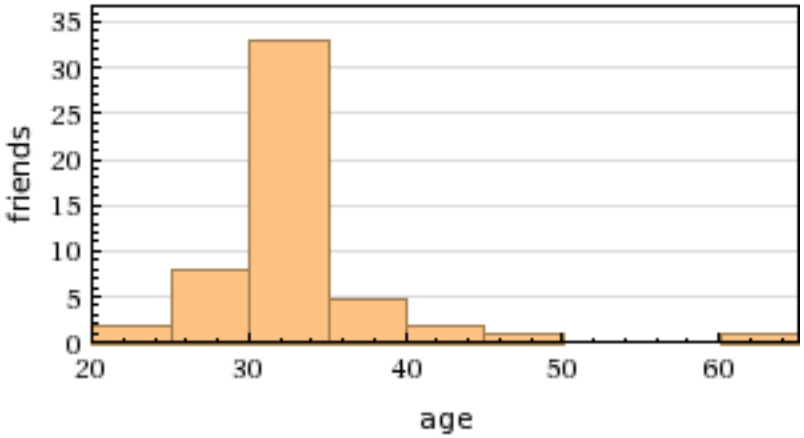
Worlframalpha.com Facebook Report





(based on 226 of 240 friends)



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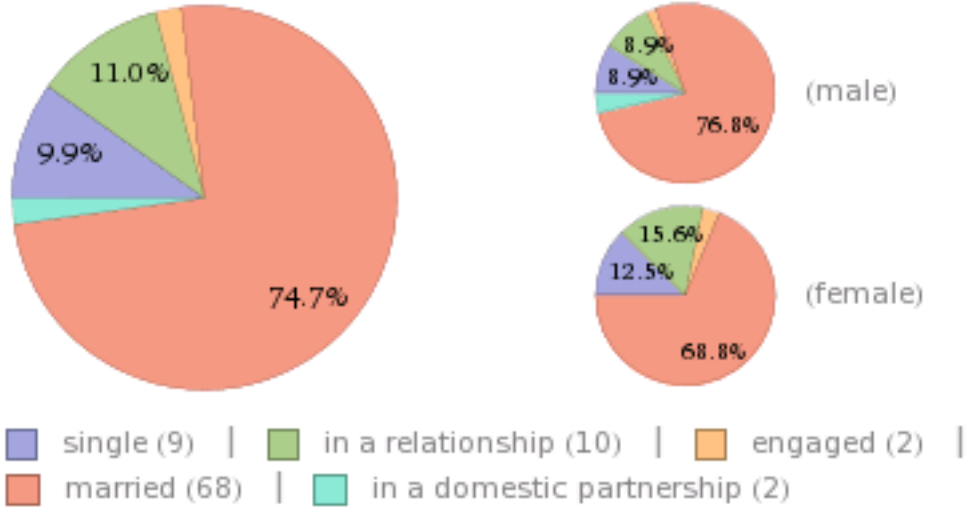

(based on 91 of 240 friends)

- For Tuesday: have read up through chapter 2
- Next week will start chapter 3

- New lab today: Simple Programs

- Integer division?
  - 1//3
  - -1//3

- Range start at something other than 0?
  - range([start,] stop [,step])

```
for i in range(5):
    print (i*i)

for i in [3, 1, 4, 1, 5]:
    print (i, end=" ")

for i in range(4):
    print ("Hello")

for i in range(5):
    print (i, 2**i)
```

- Print out 1, 2, 3, 4
  - Using a for loop, each on a different line
  - Using a for loop, on the same line
  - Now, print out the reverse sequence by changing only the print statement (not the for statement)

Summing

```
sum=0
for i in range(5):
    sum = sum + i
    print (sum)
```

- Psudocode
  - More precise than English
  - Not a programming language
  - Good for thinking

- Program to convert C to F?

  $F \approx (9/5)C + 32$

The Software Development Process

- Analyze the Problem
- Determine Specification
- Create a Design
- Implement Design
- Test/Debug the Program
- Maintain Program

Example Program: Temperature Converter

- Problem:
  - US student needs to know temperature in F

Example Program: Temperature Converter

- Analysis
  - temperature is given in Celsius
  - user wants it in degrees Fahrenheit

- Specification
  - Input – temperature in Celsius
  - Output – temperature in Fahrenheit
  - Output = 9/5(input) + 32

Example Program: Temperature Converter

- Design
  - Input, Process, Output (IPO)
  - Prompt the user for input (Celsius temperature)
  - Process it: convert to Fahrenheit. F = 9/5(C) + 32
  - Output the result to screen

Example Program: Temperature Converter

- Before coding write a rough draft program

- Psudocode
  - More precise than English
  - Not a programming language
  - Good for thinking

Example Program: Temperature Converter

- Pseudocode:
  - Input temperature in degrees Celsius (call it celsius)
  - Calculate fahrenheit as (9/5)*celsius+32
  - Output fahrenheit

- Next, convert to Python

Example Program: Temperature Converter

```
#convert.py
# A program to convert Celsius temps to Fahrenheit
# by: Susan Computewell

def main():
    celsius = eval(input("What is the Celsius temperature? "))
    fahrenheit = (9/5) * celsius + 32
    print("The temperature is ",fahrenheit," degrees Fahrenheit.")

main()
```

Example Program: Temperature Converter

- Once we write a program, we should test it!

```
>>>
What is the Celsius temperature? 0
The temperature is  32.0  degrees Fahrenheit.
>>> main()
What is the Celsius temperature? 100
The temperature is  212.0  degrees Fahrenheit.
>>> main()
What is the Celsius temperature? -40
The temperature is  -40.0  degrees Fahrenheit.
>>>
```

- Industrial-strength testing
  - http://trenchescomic.com/tales/post/advancement-lies

- Maintenance
  - Documentation
  - Knowledge transfer

- Google Glass
  - http://www.youtube.com/watch?v=9c6W4CCU9M4
  - http://www.youtube.com/watch?v=t3TAOYXT840

Example Program: Future Value

- Problem:
  - Our student wants to invest money in a savings account but doesn't know how much he'll make over 10 years.

The Software Development Process

- **Analyze the Problem**
- **Determine Specification**
- **Create a Design**
- **Implement Design**
- **Test/Debug the Program**
- **Maintain Program**

Example Program: Future Value

- Analysis
  - Money deposited in a bank account earns interest
  - How much will account be worth in 10 years?
  - Inputs: principal, interest rate
  - Output: value of the investment in 10 years

  - Assumptions?

Example Program: Future Value

- Specification
  - User enters initial amount to invest (the principal)
  - User enters annual percentage rate (the interest)

Example Program: Future Value

- **Program** Future Value

- **Inputs**
  - principal: amount of money being invested, in dollars
  - apr: annual percentage rate expressed as decimal number

- **Output**
  - Total value of the investment 10 years in the future

- **Process**
  - Value after one year is given by *principal* * (1 + *apr*)
  - This needs to be done 10 times.

Example Program: Future Value

Design

- Print an introduction
- Input the amount of the principal (principal)
- Input the annual percentage rate (apr)
- Repeat 10 times:
  - principal = principal * (1 + apr)
- Output the value of principal

Example Program: Future Value

- Implementation
  - Each line translates to one line of Python (in this case)
  - Print an introduction

    print ("This program calculates the future")
    print ("value of a 10-year investment.")
  - Input the amount of the principal

    principal = eval(input("Enter the initial principal: "))

Example Program: Future Value

- Input the annual percentage rate
  apr = eval(input("Enter the annual interest rate: "))
- Repeat 10 times:
  for i in range(10):
- Calculate principal = principal * (1 + apr)

  principal = principal * (1 + apr)
- Output value of the principal at end of 10 years
  print ("The value in 10 years is:", principal)

Example Program: Future Value

```
# futval.py
#    A program to compute the value of an investment
#    carried 10 years into the future

def main():
   print("This program calculates the future value of a 10-year investment.")

   principal = eval(input("Enter the initial principal: "))
   apr = eval(input("Enter the annual interest rate: "))

   for i in range(10):
      principal = principal * (1 + apr)

   print ("The value in 10 years is:", principal)

main()
```

Example Program: Future Value

```
>>> main()
This program calculates the future value of a 10-year investment.
Enter the initial principal: 100
Enter the annual interest rate: .03
The value in 10 years is: 134.391637934
>>> main()
This program calculates the future value of a 10-year investment.
Enter the initial principal: 100
Enter the annual interest rate: .10
The value in 10 years is: 259.37424601
```

Example Program: Distance Averager

- Problem:
  - Our poor study-abroad student in Europe needs to know the average distance between three cities, in miles.
  - 1 Kilometer = 0.62 Mile