CS 116 TUTORIAL 2

MAKING DECISIONS IN PYTHON
REMINDERS

• Assignment 2 is due on Wednesday Jan 30th at 10AM

• Midterm is on Monday, Mar 4th, at 7 PM

• Come to office hours if you need help.
BOOLEANS (REVIEW FROM LAST WEEK)

• **Values:** True, False (Capitalization!)

• **Boolean Operations:**
  and, or, not

• **Relational Operators:**
  <, >, <=, >=, ==, !=

• **Example:** 5 < 6
CQ1

- What’s the value of x?
  A. True
  B. False
  C. Error

\[
y = (2 == 3) \\
m = 4 \\
m == y \\
m = 4 < 6 \\
x = y \text{ and } m
\]
CONDITIONALS

• Conditions:
  – if : to start a condition
  – elif : to continue a set conditions (optional)
  – else : to execute something if all other conditions in the set are not true (optional)
• What is returned if you run f(3)?

A. 3
B. 6
C. 9
D. None
E. Error

```python
def f(x):
    if x > 0 and (x%2) == 0:
        return x*2
    elif (x//2) == 1 and (x%2) == 0:
        return x ** 2
```

TIPS

• Make sure that you have return statements inside your conditions when needed.

• Double-check that your conditions are in the correct order
def choices(n):
    answer = 0
    if n % 2 == 0:
        answer = answer + 1
    if n % 3 == 0:
        answer = answer + 1
    elif n % 5 == 0:
        answer = answer + 1
    else:
        answer = 10 * answer
    if n % 10 == 0:
        answer = answer - 1
    if n % 4 == 0:
        answer = answer // 2
    else:
        answer = 2 * answer
    return answer

Ensure you understand the results of calling:

- choices(8)
- choices(10)
- choices(100)
- choices(111)
- choices(250)
- choices(360)
If you are given three sticks, you may or may not be able to arrange them in a triangle.

If any of the three lengths is greater than the sum of the other two, then you cannot form a triangle. Otherwise, you can. If the sum of two lengths equals the third, they form what is called a "degenerate triangle."

Write a function `is_triangle` that consumes three positive integers \((s_1, s_2, \text{ and } s_3)\) representing the lengths of three sticks and returns one of the following:

"No triangle exists" if no triangle can be built with the three sticks.

"Degenerate triangle exists" if a degenerate triangle exists for sticks of these lengths.

"Triangle exists" if a triangle can be made from the sticks.
Fermat’s Last Theorem states that given positive integers $a$, $b$, and $n$, there exists no integer $c$ for which $a^n + b^n = c^n$ unless $n \leq 2$.

Although Fermat wrote the statement of this theorem in the margin of a book in 1637, it was not proven until 1995 (and not for lack of trying – thousands of incorrect proofs of the theorem were put forward before it was finally proven).
Write a function `fermat_check` that consumes four positive integers, \( a, b, c, \) and \( n; n \geq 2 \).

- If \( n = 2 \), and \( a^2 + b^2 = c^2 \), then your function should return “Pythagorean triple”.

- If \( n = 2 \), and \( a^2 + b^2 \) is not \( c^2 \), then your function should return “Not a Pythagorean triple”.

- If \( n > 2 \), and \( a^n + b^n = c^n \), then your function should return “Fermat was wrong!”, as you have found a counterexample to Fermat’s Last Theorem.

- Otherwise, your function should return “Not a counterexample”.
Write a function `three_of_a_kind` which consumes 4 integers, \(d_1, d_2, d_3, d_4\). The function returns `True` if exactly three of the consumed values are equal to each other, and `False` otherwise.

For example,

```python
three_of_a_kind(10, 10, 10, 10) => False
three_of_a_kind(2, 3, 2, 2) => True
three_of_a_kind(2, 3, -1, 2) => False
```
QUESTION 5

Write a function \( \gcd \) which consumes 2 positive integers, \( a \) and \( b \), and returns the greatest common divisor of \( a \) and \( b \).

For example,

\[
\gcd(10, 14) \Rightarrow 2 \\
\gcd(80, 20) \Rightarrow 20
\]