

Homework 4 if..then

Title: 3 questions

Aim

Build the whole structure of nested if..else in a simple game of N-questions
Here is an example of the game of 3 questions

Think of a number between 1..8

depth = 3 (3 questions)

Q1: is it greater than 4

A1: yes

Q2: is it greater than 6

A2: yes

Q3: is it greater than 7

A1: yes

the number is 8

A1: no

the number is 7

A2: no

Q3: is it greater than 5

A3: yes

the number is 6

A3: no

the number is 5

A1: no

Q2: is it greater than 2

A2: yes

Q3: is it greater than 3

A3: yes

the number is 4

A3: no

the number is 3

A2: no

Q3: is it greater than 1

A3: yes

the number is 2

A3: no

the number is 1

The above game can be written in Python program like the following.

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# homework week 4
# game of N-questions

# example game "what is the number in your mind?"
# with 3 questions

print("Think of a number between 1..8")
ans = input("Is it greater than 4? ").strip()
if( ans == "yes" ):
    ans = input("Is it greater than 6? ").strip()
    if( ans == "yes" ):
        ans = input("Is it greater than 7? ").strip()
        if( ans == "yes" ):
            print("the number is 8")
        elif( ans == "no" ):
            print("the number is 7")
    elif( ans == "no" ):
        ans = input("Is it greater than 5? ").strip()
        if( ans == "yes" ):
            print("the number is 6")
        elif( ans == "no" ):
            print("the number is 5")
elif( ans == "no" ):
    ans = input("Is it greater than 2? ").strip()
    if( ans == "yes" ):
        ans = input("Is it greater than 3? ").strip()
        if( ans == "yes" ):
            print("the number is 4")
        elif( ans == "no" ):
            print("the number is 3")
    elif( ans == "no" ):
        ans = input("Is it greater than 1? ").strip()
        if( ans == "yes" ):
            print("the number is 2")
        elif( ans == "no" ):
            print("the number is 1")

```

Here is an example of a run: (I think of the number 3)

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Think of a number between 1..8
Is it greater than 4? no
Is it greater than 2? yes
Is it greater than 3? no
the number is 3

```

Your work is :

1. Draw the flowchart of the above example program.

Draw flowchart สามารถเขียนด้วยลายมือ หรือว่าจะไปใช้ software ให้สวย ๆ เช่น ไปลองใช้ที่

<https://app.diagrams.net/>

2. Create a game of 4-questions. (It will double the length of the example program). Create your own questions and answers.

3. Bonus: The above example has only two kinds of answer: yes, no. Write extra lines to check when the answer is not yes or no and print "invalid answer".

Note for pondering about this game.

This kind of game uses the strategy of "divide and conquer" to nail down the answer. Each question aims to divide all possible answers in half. Each answer chooses which half the remaining possible answers are. So with 3 questions, all possible answer is 8. The first question reduces the possible answer to 4 etc.

If you have all possible answer N, then using this "divide and conquer" strategy you just question $\log_2(N)$ times to get the correct answer.