

POGIL Activity 2 (MA9): Nested IF/ELSE Statements

“Decisions, decisions – decisions within decisions!”

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Manager name: _____

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Learning Objectives

Students will be able to:

Content:

- Explain the purpose of a nested if-else statement
- Explain how to use Python if-elif structure
- Explain how to test code using Python if-elif structure

Process:

- Write code that includes if-elif statements
- Write code that uses if-elif statements and functions

Prior Knowledge

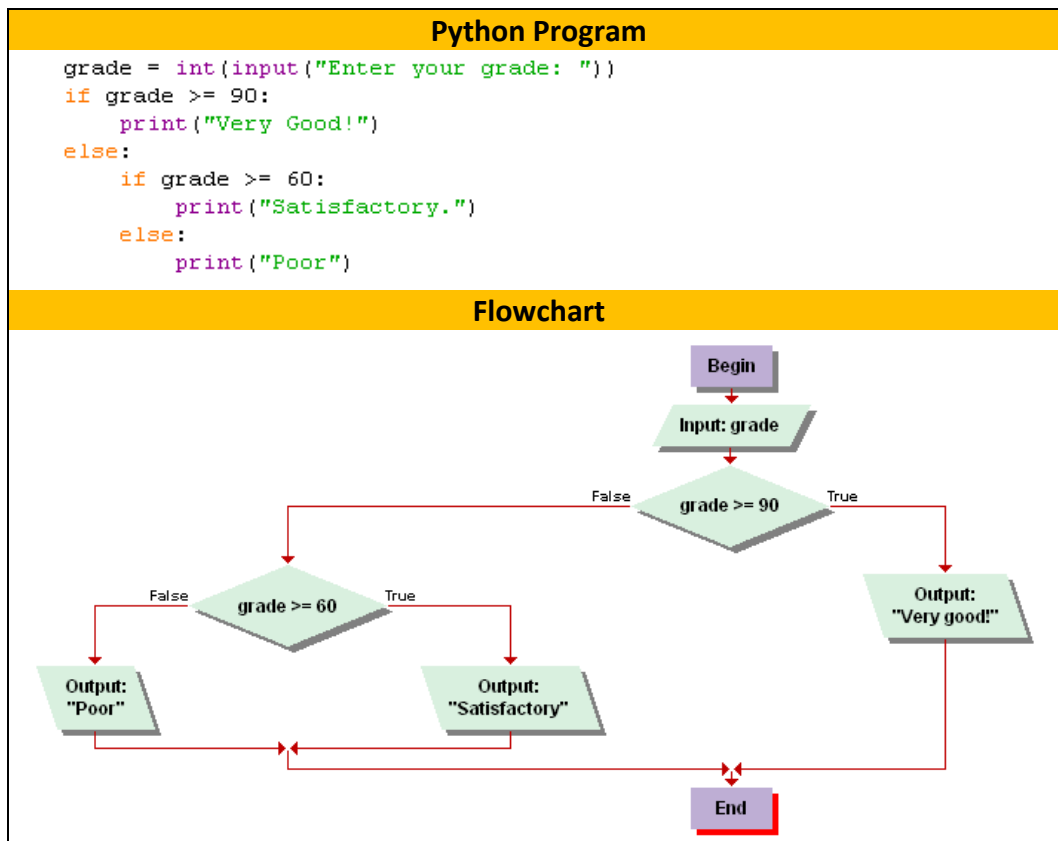
- Python concepts from L1-1 through L5-2
- Understanding of flowchart input symbols (diamond = decision, rectangle = process, arrow = flow direction)

Further Reading

- L6-1: <http://nbviewer.jupyter.org/github/g sprint23/cpts111/blob/master/lessons/L6-1.ipynb>

Critical Thinking Questions:

1. Closely examine the flowchart and Python program above.



- a. Draw arrows between each flowchart symbol and the equivalent Python code.
- b. In the Python code, circle the if/else statement that is **nested** within another if/else statement.
- c. Enter and test the code. List five numbers that you would use to test this program. Indicate why you chose the numbers. Why were you asked to test the program with 5 numbers – why would less than 5 not be sufficient?

2. Enter and execute the following Python program using the same data as you used for #1c.

```
# Description: This program prompts the user for their numeric grade
# and prints one of three messages depending on the grade.

grade = int(input("Enter your grade: "))
if grade >= 90:
    print("Very Good!")
elif grade >= 60:
    print("Satisfactory.")
else:
    print("Poor")
```

- a. How does the output for this program compare with the output for the previous program?
- b. What new **keyword** is used in this program?
- c. Notice the syntax of this program compared to the previous program. Which program contains simpler indentation?

FYI: **elif** is the Python keyword that represents **else if** and allows you to test for one of several options. As soon as one of the tests is true, the rest are ignored.

- d. You can use **elif** as many times as you need to. Suppose you wanted to add the comment “Good!” for grades that are between 80 and 89. Where would you add it? What would it look like?
- e. Does the placement of an additional **elif** clause matter?
- f. When is the code associated with the **else** statement executed?
- g. Describe how an **if/elif/else** statement works.

- h. Change the program in #2 so that it prints the following messages. Write the code below.

Greater than 90	"Very Good!"
Between 80 and 89	"Good!"
Between 70 and 79	"Satisfactory"
Between 60 and 69	"Fair"
Less than 60	"Poor"

- i. Make a final change to the program so that it prints an error message if the grade entered is greater than 100 or less than 0.
3. Is the use of the **else** statement mandatory when creating an **if/elif** statement? Explain your answer.

Application Questions: Use the Python Interpreter to check your work

1. Write an **if/elif** statement that assigns a value to the variable **bonus** depending on the amount of sales. Assume the amount of the sales is stored in a variable called **sales**.

Sales	Bonus
>= 100,000	10,000
>= 75,000	5,000
>= 50,000	2,500
>= 25,000	1,000

2. Complete the function code for the following program. The function should contain an **if/elif/else** statement. Examine the program and sample output below to determine what the function should do.

```
# Description: This program prompts the user for a water temperature and
# and tells the user if the water is in a solid state, liquid state or gaseous
# state

def getState(temperature):
    # Place if/elif statement here

    Place missing code here

##### Main Program #####

temp = int(input("Enter water temperature: "))
print("Water at", temp, "degrees is", getState(temp))
```

Sample Output

```
>>> =====
>>>
Enter water temperature: 56
Water at 56 degrees is liquid
>>> =====
>>>
Enter water temperature: 234
Water at 234 degrees is gas
>>> =====
>>>
Enter water temperature: 12
Water at 12 degrees is frozen
```

3. Carefully **examine and then complete** the following *Python* program. The program prompts the user to enter a number between 1 and 5 and also generates a random number between 1 and 5 (the code: `randNum = random.randint(1, 5)` does this). The program prints the number the user enters and prints the random number. The program then compares the two numbers.
- If the numbers are the same, it prints the message “You picked the same number as the computer!”.
 - If the number the user entered is higher than the random number, the program should print “Your number is higher than the computer’s number.”
 - Otherwise, it should print: “Your number is smaller than the computer’s number”.

a. Explain what the if/else statement does in the program below.

b. Complete the program by filling in “Place missing code”.

```
import random

def getMessage(userNum, randNum):
    Place missing code

##### Main Program #####

userNum = int(input("Enter a number between 1 and 5: "))
if userNum > 5 or userNum < 1:
    print("Invalid number was entered. Program terminated.")
else:
    randNum = random.randint(1,5)
    print("Computer number:", randNum)
    print("User number:", userNum)
    print(getMessage(userNum, randNum))
```

Sample Output

```
>>>
Enter a number between 1 and 5: 3
Computer number: 3
User number: 3
You picked the same number as the computer!
>>> ===== RESTART =====
>>>
Enter a number between 1 and 5: 3
Computer number: 4
User number: 3
Your number is smaller than the computer's number.
>>> ===== RESTART =====
>>>
Enter a number between 1 and 5: 3
Computer number: 1
User number: 3
Your number is higher than the computer's number.
```