**CHAPTER 3 “lab gems”**

* Decision structure: specific action(s) performed only if a condition exists
  + Also known as selection structure
* In flowchart, diamond represents true/false condition that must be tested
* Actions can be conditionally executed
  + Performed only when a condition is true
* Single alternative decision structure: provides only one alternative path of execution
  + If condition is not true, exit the structure
* Python syntax:

if condition:

Statement

Statement

* First line known as the if clause
  + Includes the keyword if followed by condition
    - The condition can be true or false
    - When the if statement executes, the condition is tested, and if it is true the block statements are executed. otherwise, block statements are skipped
* Relational operator: determines whether a specific relationship exists between two values
  + Example: greater than (>)
  + >= and <= operators test more than one relationship
    - It is enough for one of the relationships to exist for the expression to be true
  + == operator determines whether the two operands are equal to one another
    - Do not confuse with assignment operator (=)
  + != operator determines whether the two operands are not equal
  + Any relational operator can be used in a decision block
    - Example: if balance == 0
    - Example: if payment != balance
  + Strings can be compared using the == and != operators
  + String comparisons are case sensitive
  + Strings can be compared using >, <, >=, and <=
    - Compared character by character based on the ASCII values for each character
    - f shorter word is substring of longer word, longer word is greater than shorter word
* It is possible to have a block inside another block
  + Example: if statement inside a function
  + Statements in inner block must be indented with respect to the outer block
* Dual alternative decision structure: two possible paths of execution
  + One is taken if the condition is true, and the other if the condition is false

Syntax: if condition:

statements

else:

other statements

* + if clause and else clause must be aligned
  + Statements must be consistently indented

**Lab Exercise 3**

**Focus**

1. Boolean expressions and operators

2. Simple and Nested if-else structures

**Part A: Building upon an Existing Solution**

For this portion of the lab you will modify the design of your Lab 2 solution so that you can perform some conditional tests. For this lab:

1. You will validate input to ensure that the user enters inputs within a certain range or larger than a certain minimum value. You will validate the inputs as follows:

a. The user cannot enter a negative number for:

i. Miles to kilometers

ii. Gallons to liters

iii. Pounds to kilograms

iv. Inches to centimeters

b. The user cannot enter a value above 1000 degrees for Fahrenheit to Celsius

2. If the user enters an invalid value, then the program will issue an error message and terminate immediately. (Do NOT accept further data).

3. Save the program as firstname\_lastname\_Lab3a.py where you will replace firstname and lastname with your actual first and last name.

4. Test all conditions prior to submitting.

**Part B: Write Something New!**

Write a complete and syntactically correct Python program to solve the following problem:

You are the payroll manager for SoftwarePirates Inc. You have been charged with writing a package that calculates the monthly paycheck for the salespeople. Salespeople at SoftwarePirates get paid a base salary of $2000 per month. Beyond the base salary, each salesperson earns commission on the following scale:

**Sales Commission Rate Bonus**

<$10000 0% 0

$10000 – $100,000 2% 0

$100,001 - $500,000 15% $1000

$500,001 - $1,000,000 28% $5000

>$1,000,000 35% $100,000

1. The following additional conditions apply:

2. If a salesperson has taken more than 3 vacation days in a month, their pay gets reduced by $200

3. A salesperson earns a bonus **only** if they have been with the company for 3 months or more

4. For salespeople who have been with the company for 5 years or more and who have made sales greater than $100,000 an additional bonus of $1000 is added.

All input to the program will be interactive from the keyboard. The output of the program will include:

a. The name of the salesperson

b. Their longevity with the company

c. Their base salary

d. The commission earned (in Dollars)

e. The bonus earned

f. Additional bonus earned (if any)

g. Deductions (if any)

h. A total gross paycheck

i. Your output should look like a paystub (NOT in paragraph format)

j. All currency should be formatted with a $ sign and 2 decimal places **(LO 1, 2, 3).**

Use the IDLE programming environment. Please save your file as firstname\_lastname\_Lab3b.py where you will replace firstname and lastname with your actual first name and last name.

Remember to use the extension .py.

Run and test your program for all conditions. Once you are sure it works you will turn in the items listed in the next section.

**Turn In**

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| All labs will be graded in Blackboard. Once you are done with the lab turn it in to the Lab 3 link. For this lab you will turn into Blackboard the following TWO items:  1. The Python code file you saved in part A  2. The Python code file you saved in part B |