LAB 9 ASSIGNMENT

Ch. 6 Functions

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LAB 9.1 – ALGORITHMS

Algorithm 1: As shown in this chapter, write a pseudocode statement that generates a random number in the range of 1 – 100 and assigns it to a variable named `rand`.

```
//The random library function returns a random integer between (a, b)
//which are both included in the generation unlike range
Set rand = random(1, 100)
```

Algorithm 2: The following pseudocode statement calls a function named `half`, which returns a value that is half of the argument. (Assume both the `result` and `number` variables are `Real`). Write pseudocode for the function:

```
Set result = half(number)
//Writing Functions are similar to Modules
Function Real half(Real number)
   Declare Real result
   Set result = number / 2
   Return result
End Function
```

Algorithm 3: A pseudocode program contains the following function definition:

```
Function Integer cube(Integer num)
   Return num * num * num
End Function
```

Write a statement that passes the value 4 to this function and assigns its return value to the variable `result`.

```
//Again, Functions are like Modules, in that to pass an argument you
//include it in the parentheses
result = cube(4)
```

Algorithm 4: Design a pseudocode function named `timesTen` that accepts an `Integer` argument. When the function is called, it should return the value of its argument multiplied times 10.

```
//Define the Function timesTen with an Int
Function Integer timesTen(Integer num)
   //Declare Int result and set it to num * 10
   Declare Integer result
   Set result = num * 10
   //Return the product of result
   Return result
End Function
```

Algorithm 5: Design a pseudocode function named `getFirstName` that asks the user to enter their first name, and returns it.

```
//Use a String datatype to allow users to enter their name
Function String getFirstName(String fName)
```

```
    Display "Enter your first name."
    Input fName
    Return fName
```

- `End Function`

Algorithm 6: Assume that a program has two `String` variables named `str1` and `str2`. Write a pseudocode statement that assigns an all uppercase version of `srt1` to the `str2` variable.

```
- Function String capWords(String str1, String str2)
    Display "Enter a word."
    Input str1
    Display "Enter a word."
    Input str2
    //Utilize the toUpper function to return a string in all uppercase
    Display toUpper(str1, str2)
  End Function
```

LAB 9.2 – DEBUGGING EXERCISES

Exercise 1: The programmer intends for this pseudocode to display three random numbers in the range of 1 – 7. According to the way we've been generating random numbers in this book, however, there appears to be an error. Where is it?

```
1. //This program displays three random numbers in the range of 1 - 7
2. Declare Integer count
3. //Display three random numbers
4. For count = 1 To 3
   5. Display random(1, 7)
6. End For
```

An error occurs between Lines 5 and 6, because the variable count isn't set to the random. To fix it, add another line between them and set count to equal random(1, 7) as follows:

```
1. //This program displays three random numbers in the range of 1 - 7
2. Declare Integer count
3. //Display three random numbers
4. For count = 1 To 3
   5. Set count = random(1, 7)
   6. Display count
6. End For
```

Exercise 2: Can you find the reason that the following pseudocode function does not return the value indicated in the comments?

```
1. //The calcDiscountPrice function accepts an item's price and the discount
2. //percentage as argument. It uses those values to calculate and return
3. //the discounted price.
4. Function Real calcDiscountPrice(Real price, Real percentage)
   5. //Calculate the discount
   6. Declare Real discount = price * percentage
   7. //Subtract the discount from the price
   8. Declare Real discountPrice = price - discount
   9. //Return the discount price
   10. Return discount
11. End Function
```

An error occurs on Line 10: For Line 10, the function returns the discount instead of the discount price. To fix it, change the discount variable in Line 10 to discountPrice as follows:

the 'Const' keyword used should be replaced with 'Constant'; And for Line 3, the condition less than (<) should be changed to less than or equal to (<=) to ensure the loop iterates, as follows:

```
1. //The calcDiscountPrice function accepts an item's price and the discount
2. //percentage as argument. It uses those values to calculate and return
3. //the discounted price.
4. Function Real calcDiscountPrice(Real price, Real percentage)
   5. //Calculate the discount
   6. Declare Real discount = price * percentage
   7. //Subtract the discount from the price
   8. Declare Real discountPrice = price - discount
   9. //Return the discount price
   10. Return discountPrice
11. End Function
```

Exercise 3: Can you find the reason that the following pseudocode does not perform as indicated in the comments?

```
1. //Find the error in the following pseudocode:
2. Module main()
   3. Declare Real value, result
   4. //Get a value from the user
   5. Display "Enter a value."
   6. Input value
   7. //Get 10 percent of the value
   8. Call tenPercent(value)
   9. //Display 10 percent of the value
   10. Display "10 percent of ", value, " is ", result
11. End Module
12. //The tenPercent function returns 10 percent of the argument passed to
13. //the function.
14. Function Real tenPercent(Real num)
   15. Return num * 0.1
16. End Function
```

An error occurs on Line 8, because though the function was called, it wasn't set to the result variable in the main module which results in error. To fix it, set the result variable to equal tenPercent(value) as follows:

```
1. //Find the error in the following pseudocode:
2. Module main()
   3. Declare Real value, result
   4. //Get a value from the user
   5. Display "Enter a value."
   6. Input value
   7. //Get 10 percent of the value
   8. Set result = tenPercent(value)
   9. //Display 10 percent of the value
   10. Display "10 percent of ", value, " is ", result
11. End Module
12. //The tenPercent function returns 10 percent of the argument passed to
13. //the function.
14. Function Real tenPercent(Real num)
   15. Return num * 0.1
16. End Function
```