Common Mistakes with Functions

CSE 1310 – Introduction to Computers and Programming
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Common Mistakes with Functions

- Printing instead of returning.
- Returning the wrong value.
- Asking the user for input instead of using arguments.
- Not taking the arguments that were specified.
- Including extra code in your submissions (like testing code).
- All these problems will be penalized severely.
  - I have not found a better way to convince people to avoid these problems.

An Example Assignment Task

- File task17.java contains an incomplete program. Complete that program, by defining a **`season`** function, that satisfies the following specs:
  - It takes one argument, called month.
  - If month is "March", "April", or "May", the function should return "spring".
  - If month is "June", "July", or "August", the function should return "summer".
  - If month is "September", "October", or "November", the function should return "fall".
  - If month is "December", "January", or "February", the function should return "winter".
  - In all other cases, the function should return the string "unknown"

Example Main File

```
import java.util.Scanner;
public class task17
{
  public static void main(String[] args)
  {
    Scanner in = new Scanner(System.in);
    while (true)
    {
      System.out.printf("Enter a month, or q to quit: ");
      String word = in.next();
      if (word.equals("q"))
      {
        System.out.printf("Exiting...\n");
        System.exit(0);
      }
      String s = season(word);
      System.out.printf("%s is in %s.\n\n", word, s);    }
  }
}
```

Example of Desired Output

Enter a month, or q to quit: June
June is in summer.

Enter a month, or q to quit: May
May is in spring.

Enter a month, or q to quit: ww
ww is in unknown.

Enter a month, or q to quit: q
Exiting...

Wrong Solution #1

```
public static String season(String month)  {
   if (month.equals("March") || month.equals("April") || month.equals("May"))
   {
       System.out.printf("spring");
   }
   else if (month.equals("June")||month.equals("July")||month.equals("August"))
   {
     System.out.printf("summer");
   }
   else if
  (month.equals("September")||month.equals("October")||month.equals("November"))
   {
     System.out.printf("fall");
   }
   else if
  (month.equals("December")||month.equals("January")||month.equals("February"))
   {
     System.out.printf("winter");
   }
   else
   {
     System.out.printf("unknown");
   }  }
```

What is wrong with this solution?

Wrong Solution #1

```
public static String season(String month)  {
   if (month.equals("March") || month.equals("April") || month.equals("May"))
   {
       System.out.printf("spring");
   }
   else if (month.equals("June")||month.equals("July")||month.equals("August"))
   {
     System.out.printf("summer");
   }
   else if
  (month.equals("September")||month.equals("October")||month.equals("November"))
   {
     System.out.printf("fall");
   }
   else if
  (month.equals("December")||month.equals("January")||month.equals("February"))
   {
     System.out.printf("winter");
   }
   else
   {
     System.out.printf("unknown");
   }  }
```

What is wrong with this solution?
This will not even compile.
It does not return anything,
it should return a String.

Wrong Solution #2

```
public static String season(String month)  {
   if (month.equals("March") || month.equals("April") || month.equals("May"))
   {
       System.out.printf("spring");
   }
   else if (month.equals("June")||month.equals("July")||month.equals("August"))
   {
     System.out.printf("summer");
   }
   else if
  (month.equals("September")||month.equals("October")||month.equals("November"))
   {
     System.out.printf("fall");
   }
   else if
  (month.equals("December")||month.equals("January")||month.equals("February"))
   {
     System.out.printf("winter");
   }
   else
   {
     System.out.printf("unknown");
   }
    return "";}
```

What is wrong with this solution?
It prints what it should be returning.

Output for Wrong Solution #2

Enter a month, or q to quit: June
summerJune is in .

Enter a month, or q to quit: May
springMay is in .

Enter a month, or q to quit: ww
unknownww is in .

Enter a month, or q to quit: q
Exiting...

What Is Wrong with Solution #2

- There are two ways to tell that something is wrong:
  - 1: look at the function. It should be clear that it only returns an empty string, which violates the specs.
  - 2: look at the output. It is clear that this output does not match the desired output.

Wrong Solution #3

```
public static void season(String month)   {
   if (month.equals("March") || month.equals("April") || month.equals("May"))
   {
     System.out.printf("%s is in spring.\n\n", month);
   }
   else if (month.equals("June")||month.equals("July")||month.equals("August"))
   {
     System.out.printf("%s is in summer.\n\n", month);
   }
   else if
  (month.equals("September")||month.equals("October")||month.equals("November"))
   {
     System.out.printf("%s is in fall.\n\n", month);
   }
   else if
  (month.equals("December")||month.equals("January")||month.equals("February"))
   {
     System.out.printf("%s is in winter.\n\n", month);
   }
   else
   {
     System.out.printf("unknown");
   }  }
```

What is wrong with this solution?

Wrong Solution #3

```
public static void season(String month)   {
  if (month.equals("March") || month.equals("April") || month.equals("May"))
  {
    System.out.printf("%s is in spring.\n\n", month);
  }
  else if (month.equals("June")||month.equals("July")||month.equals("August"))
  {
    System.out.printf("%s is in summer.\n\n", month);
  }
  else if
 (month.equals("September")||month.equals("October")||month.equals("November"))
  {
    System.out.printf("%s is in fall.\n\n", month);
  }
  else if
 (month.equals("December")||month.equals("January")||month.equals("February"))
  {
    System.out.printf("%s is in winter.\n\n", month);
  }
  else
  {
    System.out.printf("unknown");
  }  }
```

What is wrong with this solution?
It also does not return anything.
It is declared as void, so Java will not run it, unless…

Wrong Solution #3

```
public static void main(String[] args)
 {
   Scanner in = new Scanner(System.in);

   while (true)
   {
     System.out.printf("Enter a month, or q to quit: ");
     String word = in.next();
     if (word.equals("q"))
     {
       System.out.printf("Exiting...\n");
       System.exit(0);
     }
     season(word);
    }
 }
```

Wrong Solution #3 will give the correct output, if you modify main to as shown above.

MODIFYING MAIN IS NOT ALLOWED.

Wrong Solution #4

```
public static String season(String m)   {
    Scanner in = new Scanner(System.in);
    System.out.printf("Enter a month, or q to quit: ");
    String month = in.next();
   if (month.equals("March") || month.equals("April") || month.equals("May"))
   {
       return "spring";
   }
   else if (month.equals("June")||month.equals("July")||month.equals("August"))
   {
     return "summer";
   }
   else if (month.equals("September")||month.equals("October")||month.equals("November"))
   {
     return "fall";
   }
   else if (month.equals("December")||month.equals("January")||month.equals("February"))
   {
     return "winter";
   }
   else
   {
     return "unknown";
   }
}
```

What is wrong with this solution?

Wrong Solution #4

```
public static String season(String m)   {
    Scanner in = new Scanner(System.in);
    System.out.printf("Enter a month, or q to quit: ");
    m = in.next();
   if (month.equals("March") || month.equals("April") || month.equals("May"))
   {
       return "spring";
   }
   else if (month.equals("June")||month.equals("July")||month.equals("August"))
   {
     return "summer";
   }
   else if (month.equals("September")||month.equals("October")||month.equals("November"))
   {
     return "fall";
   }
   else if (month.equals("December")||month.equals("January")||month.equals("February"))
   {
     return "winter";
   }
   else
   {
     return "unknown";
   }
}
```

What is wrong with this solution?
It asks the user to enter a month, instead of using the argument.

Output for Wrong Solution #4

Enter a month, or q to quit: June
Enter a month, or q to quit: June
June is in summer.

Enter a month, or q to quit: May
Enter a month, or q to quit: May
May is in spring.

Enter a month, or q to quit: ww
Enter a month, or q to quit: w
ww is in unknown.

Enter a month, or q to quit: q
Exiting...

What Is Wrong with Solution #4

- Again, there are two ways to tell that something is wrong:
  - 1: look at the function, understand that **it is not using the argument**.
  - 2: look at the output, the program is asking twice for each month.

Correct Solution

```
public static String season(String month)   {
   if (month.equals("March") || month.equals("April") || month.equals("May"))
   {
       return "spring";
   }
   else if (month.equals("June")||month.equals("July")||month.equals("August"))
   {
     return "summer";
   }
   else if
  (month.equals("September")||month.equals("October")||month.equals("November"))
   {
     return "fall";
   }
   else if
  (month.equals("December")||month.equals("January")||month.equals("February"))
   {
     return "winter";
   }
   else
   {
     return "unknown";
   }    }
```

Common Mistake: Variable Names

```
public class example1
{
  public static int test_function(int x, int y, int z)
  {
    int temporary = x*x + y*y;
    if (z < 0)
    {
      return temporary - z*z;
    }
    else
    {
      return temporary + z*z;
    }
  }

  public static void main(String[] args)
  {
    int a = 3;
    int b = 10;
    int c = 8;
    int result = test_function(a, b, c);
    System.out.printf("result = %d\n", result);
  }}
```

This code is correct.
There is nothing wrong with it.
(It doesn't matter what it does, it is a toy example).

Common Mistake: Variable Names

```
public class example1
{
  public static int test_function(int x, int y, int z)
  {
    int temporary = x*x + y*y;
    if (z < 0)
    {
      return temporary - z*z;
    }
    else
    {
      return temporary + z*z;
    }
  }

  public static void main(String[] args)
  {
    int a = 3;
    int b = 10;
    int c = 8;
    int result = test_function(x, y, z);
    System.out.printf("result = %d\n", result);
  }}
```

This code is incorrect.
It will not run.
Why?

Common Mistake: Variable Names

```
public class example1
{
  public static int test_function(int x, int y, int z)
  {
    int temporary = x*x + y*y;
    if (z < 0)
    {
      return temporary - z*z;
    }
    else
    {
      return temporary + z*z;
    }
  }

  public static void main(String[] args)
  {
    int a = 3;
    int b = 10;
    int c = 8;
    int result = test_function(x, y, z);
    System.out.printf("result = %d\n", result);
  }}
```

This code is incorrect.
It will not run.
Why?
Because variables x, y, z do not exist.

Common Mistake: Variable Names

```
public class example1
{
  public static int test_function(int x, int y, int z)
  {
    int temporary = x*x + y*y;
    if (z < 0)
    {
      return temporary - z*z;
    }
    else
    {
      return temporary + z*z;
    }
  }

  public static void main(String[] args)
  {
    int a = 3;
    int b = 10;
    int c = 8;
    int result = test_function(x, y, z);
    System.out.printf("result = %d\n", result);
  }}
```

In the function call, the variable names **do not have to match** the names of the arguments in the function declaration.

On Testing

- Assignments show you examples of input and output, to help you test the code.
- However, testing your code is primarily YOUR responsibility.
- Why?
  - whose responsibility would it be in real life? Your colleagues? Your clients?
- Failing on my example inputs means that the code is incorrect.
- Passing on my example inputs **doesn't always mean** that the code is correct.