3 Types of Errors in Programming

#1 Syntax Error: When the code that the programmer types does not follow the rules associated with the programming language we are using.

Common Syntax Errors:

```
int a = 5                                   // forgotten ;

public class myClass                        // file is named MyClass (case-sensitivity)

public void give(){                         // void method can't return a value
    return number;
}

public int magic();                         // no ; is allowed after a method header

public String name(first, last)             // parameters must be given a variable type
```

General spelling mistakes and case sensitivity mistakes

Brackets missing or placed improperly

#2 Run-Time Errors When the syntax of the code is valid but upon execution the computer is asked to do something that it can't do.

Common Run-Time Errors:

```
z = a / b;              //when b=0, ArithmeticException

arrayName[4][4];        //when referring to a 4x4 array
                        //ArrayIndexOutOfBoundsException

scan.nextInt();         //user types a double, InputMismatchException
```

#3 Logic Errors When the programmer creates code that produces incorrect results. These are also called design errors or bugs.

Common Logic Errors:

```
int average = a + b + c / 3;        // incorrect average calculated, (a+b+c)/3.0

double divide = 10/3;               // incorrect answer, try (double)10/3;

int x;                              // What is x?  Can be printed!
x++;
System.out.print(x);

for(int i=0 ; i<=arrayName.length ; i++)        //should be length –

for(int i=0 ; i<=arrayName.length-1 ; i++)
   for(int k=0 ; k<=arrayName.length-1 ; k++)   //should be arrayName[i]
```