Java Exercise Questions:

Java Basics – First Program:

1. Given the statement:

```
System.out.println("Hello, World!");
```

What is the name of:

a) a method:
b) a class:
c) an argument:

2. What's wrong with each of the following statements?

a) `System.out.println("Hello, World!")`

b) `System.out.print(Hello World);`

c) `system.out.println("Hello, World!");`

3. What is the **`public class ClassName { … }`** for?

4. What is the purpose of the `main()` method in a Java program?

5. What is displayed by the following statements?

a) `System.out.println("Hello!\nMy name is Mr. Bibs!");`

b) `System.out.println("2 plus 3 is " + 2 + 3);`

6. What's the difference between System.out.print() and System.out.println()?

7. What is a class? How do you recognize a class in your Java code?

8. a) What is the purpose of program comments or “internal program documentation”?

b) What are the two basic ways to create program comments in Java?

9. a) What is the complete path and file name of the Java compiler?

b) What is the complete path and file name of the Java interpreter?

Write a Java application that displays the following information about yourself on the console(i.e. not using dialogs)

Your first and last name

Your previous programming experience (how long? what language(s)?)

Your favourite subject in high school (or university, or wherever you were before this)

Your least favourite subject in high school (or university, or wherever you were before this)

A list of interests or things you enjoy doing in your spare time

Anything else interesting about yourself

Programs:

1. Create a program that displays a list of your three favourite foods, one food per line. Example:

```
Sydney's Favourite Foods:
Chicken
Deli Turkey
Scrambled Eggs
```

2. What is the minimum number of statements you could use in the main() method to produce the output from question 1?

3. Reformat the following code segments by hand so that they follow proper standards:

a)

```
public class BadCode { public static void main(String[]
args){ System.out.println("Flowers for Algernon");}}
```

b)

```
public class
BadCode { public static void main(String[]
args){ System.out.print("6/4*2 is ");System.
```

```
out.println(6/4*2);}}
```

4. Create a program called Tree that creates the following output:

```
    *
   ***
  *****
*******
```

OOP: Object Oriented Programming

1. Define each of the following terms:

a. object

b. instance

c. attribute

d. state of an object

e. behaviour of an object

2. Why do we say that a class is like a template or a recipe?

3. a. What is happening in the following statement:

```
Invoice custInvoice = new Invoice("2006/09/13", "123-c");
```

b. What does the "new" operator do?

4. How do we define "behaviours" in a class?

5. For each of the following things below, list some of the attributes or properties you might define if that thing were an object in a program.

a. Invoice

b. TVShow

c. HockeyTeam

1. Find the errors in each of the following code listings:

a. Listing a)

```
1  public class Qu2PartA
2  {
3      public static void main(String[] args)
4      {
5          width = 15
6          area = length * width;
7          System.out.println("The area is " + area);
8      }
9  }
```

b. Listing b)

```
1   public class Qu2PartB
2   {
3       public static void main(String[] args)
4       {
5           int length, width, area;
6           area = length * width;
7           length = 20;
8           width = 15;
9           System.out.println("The area is " + area);
10      }
11  }
```

c. Listing c)

```
1  public class Qu2PartC
2  {
3      public static void main(String[] args)
4      {
5          int length = 20, width = 15, area;
6          length * width = area;
7          System.out.println("The area is " + area);
8      }
9  }
```

2. Write a program that calculates the amount of money to tip a wait person by coding the following tasks:

1. Define a variable for the bill amount and initialize it to 35.10.
2. Define a variable for the tip percentage and initialize it to 15.
3. Define a variable for the tip amount.
4. Calculate the tip as the bill amount multiplied by the tip percentage (remember that 15% = 0.15) and assign and store the result in the tip amount variable.
5. Display the output on the screen as shown below:

Bill Amount: 35.1 Tip%: 15.0
Tip Amount: $5.265

Circle the correct answer.

1. T / F A float value can be implicitly cast into an int variable because they're both 4 bytes.

2. T / F System.out.println("5 + 1 is " + 5 + 1); will print "5 + 1 is 6".

3. T / F The format specifier %d is used to format integer values.

4. A long must be explicitly cast into a ----- variable.
- **A.** double
- **B.** char
- **C.** float
- **D.** All of the above

5. The Scanner class is in the ---- package.
- **A.** java.lang
- **B.** javax.swing
- **C.** java.util
- **D.** java.io

6. Which Scanner method will read in a whole number with no decimals?
- **A.** nextString()
- **B.** nextNumber()
- **C.** nextDouble()
- **D.** nextInt()

Short Answer Questions (answer in the space provided)

7. Write the following expression in proper Java syntax. Use math methods where appropriate.

$$\frac{2c - \sqrt{(a + b^3)}}{b}$$

8. What is the output of the following code segment?

```
int n1 = 3;
char c1 = 'F';
c1++;
System.out.print(c1);
c1 += n1;
System.out.println(c1);
```

9. For each of the statements below, identify if the statement is valid or invalid. If invalid, rewrite the statement correctly (there might be more than one way to write a statement correctly, just pick one).

```
// use these variable values:
       int number = 5;
       double area = 3.28;
```

b) `long lngValue = area;`

c) `int iNum = area;`

a) `double dblNumber = number;`

10. There are three errors in the code below. For each error, describe the error and indicate which of the three error types it is (Execution, Compilation, or Logic)

```
01: import javax.swing.JOptionPane;
02: public class QuizQuestion {
03: public static void main(String[] args) {
04: String strPrice = JOptionPane.showInputDialog(null,
05: "Enter price of wine:", "Price", JOptionPane.INFORMATION_MESSAGE);
06: double price = Double.parseDouble(strPrice);
07: String strNumBottles = JOptionPane.showInputDialog(null,
08: "Enter number of bottles:", "Inventory",
09: JOptionPane.INFORMATION_MESSAGE);
10: int numBottles = Integer.parseDouble(strNumBottles);
11: // calculate cost of all bottles in inventory
12: double totalCost = price + numBottles;
13: System.out.printf("%-10s %5.2f \n" +  "Total Cost:" + totalCost);
14: } }
```

Line #	Description of Error	Type of Error

Bonus The term "bug" or "debug" is attributed to:

- **A.** Bill Gates
- **B.** Ada Lovelace
- **C.** Steve Jobs
- **D.** Grace Hopper

1. Examine the code listing below. What do you think the output should be? Write this down. Then run the program and see if you're correct.

```
1
2       public class Question2
3       {
4             public static void main(String[] args)
5             {
6               int factor = 2;
7               int sum = 10;
8               System.out.println("sum is " + sum);
9               sum *= factor;
10              System.out.println("sum is now " + sum);
11              sum *= factor;
12              System.out.println("sum is now " + sum);
13              sum *= factor;
14              System.out.println("sum is now " + sum);
15          }
        }
```

2. How do you think the output would change if you wrote the program in question 1 like this:

```
1
2       public class Question3
3       {
4           public static void main(String[] args)
5           {
6               int factor = 2;
7               int sum = 10;
8               System.out.println("sum is " + sum);
9               sum *= factor;
10              sum *= factor;
11              sum *= factor;
12              System.out.println("sum is now " + sum);
13              System.out.println("sum is now " + sum);
14              System.out.println("sum is now " + sum);
15          }
        }
```

Logical Operations

1. Given that a = 5, b = 2, c = 4, and d = 5, what is the result of each of the following Java expression?

a. a == 5

b. b * d == c * c

c. d % b * c > 5 || c % b * d < 7

d. d % b * c > 5 && c % b * d < 7

2. Given that: a = 5 b = 2 c = 4 d = 6 e = 3 What is the result of each of the following relational expressions?

1. a > b

2. a != b

3. d % b == c % b

4. a * c != d * b

5. d * b == c * e

6. a * b < a % b * c

7. c % b * a == b % c * a

8. b % c * a != a * b

9. d % b * c > 5 || c % b * d < 7

10. d % b * c > 5 && c % b * d < 7

3. For each of the following statements, assign variable names for the unknowns and rewrite the statements as relational expressions.

1. A customer's age is 65 or more.

2. The temperature is less than 0 degrees.

3. A person's height is over 6 feet.

4. The current month is 12 (December).

5. The user enters the name "Fred".

6. The user enters the name "Fred" or "Wilma".

7. The person's age is 65 or more and their sub total is more than $100.

8. The current day is the 7th of the 4th month.

9. A person is older than 55 or has been at the company for more than 25 years.

10. A width of a wall is less than 4 metres but more than 3 metres.

11. An employee's department number is less than 500 but greater than 1, and they've been at the company more than 25 years.

4. Show the output of the following program:

```
public class Test {
public static void
main(String[] args) {
char x = 'a';
char y = 'c';
System.out.println(++y);
System.out.println(y++);
System.out.println(x > y);
System.out.println(x - y);
}
}
```

1. Copy the code below into a main() method of a new program, and fill in the missing code by following the instructions in the comments:

```
1
2       public class ScannerExercise {
3
4           public static void main(String[] args) {
5
6               // construct a scanner to get keyboard input
7
8
9               // ask the user for a decimal number
10              // (add the stmt to retrieve the value and store in an
11              // appropriate variable)
12              System.out.print("Enter a decimal number: ");
13
14              // calculate the number times itself (the square)
15              // and store in an appropriate variable (which needs
16              // to be declared - see last statement below where
17              // the variable is being used)
18
19              // user wants to see the result, this is finished so
20              // nothing to do here unless you used different variable name)
21              System.out.println("Your number squared is "
22                  + square);
23          }
24      }
25
```

1. Use the Math class documentation as a reference. What Math class methods would you use to perform the following tasks:

a. find the square root of 13
b. find the minimum value of the two numbers stored in the variables dblNum1 and dblNum2
c. find the ceiling of -123.45
d. find the floor of -123.45
e. find the absolute value of -123.45

2. Write a single statement to perform each of the following calculations and store each result in a variable of the appropriate type:

a. The square root of x - y
b. The absolute value of $a^2 - b^2$
c. The area of a circle (pi multiplied by radius-squared)

3. Write each of the following expressions as a single Java statement:

1. $c = \sqrt{a^2 + b^2}$ c equals the root of a squared plus b squared
(a squared plus b squared is all under the square root symbol)
2. $p = \sqrt{|m - n|}$ p equals the square root of the absolute value of the expression
m minus ne
3. $sum = \frac{a(r^n - 1)}{(r - 1)}$ sum equals the result of a division expression: the numerator
is the variable a times the result of the expression r to the power
of n minus 1, and the denominator is the expression r minus 1

1. Write a program that finds the ASCII/Unicode code for each of the following character values:

a. '7'
b. '1'
c. 'a'
d. 'A'
e. 'z'
f. 'Z'
g. '*'

2. Open the following chart in a new browser window/tab: Simple ASCII Table.

a. What is the decimal value for the character 'A'?
b. What is the decimal value for the character 'a'?
c. What do you think would each of the following statements would evaluate to?
   i. (char)('m' - 5)
   ii. (char)('K' + 6)
   iii. (char)('y' - 'V')
   iv. (char)('K' + '*' - 1)
d. What character has a decimal value of 0?

Exercises

1. How would you use casting to solve the problem in the TestData example in the first section?

2. Using the declaration/initialization statements below, determine the result of each of the following explicit casts.

```
double dNum1 = 5.5;
double dNum2 = 10.2;
double dNum3 = 1.1;
```

a. (int)dNum1
b. (int)dNum2

c. (int)dNum3
d. (int)(dNum1 + dNum3)
e. (int)dNum1 + dNum3
f. (double)((int)dNum1) + dNum3
g. (double)((int)(dNum1 + dNum3))

Exercise

Copy the following program. Compile it, and run it. Test the program with each of the input values below, and for each test, describe what happens and why.

1. 5
2. 5.0
3. five

```
1 public class Conversions {
2
3     public static void main(String[] args) {
4
5         Scanner in = new Scanner(System.in);
6         System.out.print("Enter a value: ");
7         String strValue = in.next();
8         int intNum = Integer.parseInt(strValue);
9         double dblNum = Double.parseDouble(strValue);
10        System.out.println(intNum + ", " + dblNum);
11    }
}
```

1. a) What is a multi-sided if-statement used for?

b) How many conditions does a multi-sided if-statement have?

2. a) How is a switch statement similar to a multi-sided if-statement?

b) Which data types can a switch statement evaluate?

c) What is the purpose of the break; statement in a switch statement?

3. a) What is the output of the following code:

```
public class Question3 {
  final static int NUM_HRS = 44;
  public static void main(String[] args) {
    double rate;
    int dept = 5;
    switch (dept) {
      case 1: case 2: case 3:
        rate = 10.5;
        break;
      case 4: case 5:
        rate = 19.95;
        break;
      case 6: case 7: case 8: case 9:
        rate = 14.55;
        break;
      default:
        rate = 0;
    }
    double total = rate * NUM_HRS;
    System.out.printf("Total Pay: $%.2f%n", total);
  }
}
```

3. b) Rewrite the code in 3.a) as an if/else-if.

4. What is the error in each of the following code segments?

a)

```
double area = 0;
if (length > 0);
{
   area = length * 25.5;
   System.out.printf("Area: %.2f%n", area);
}
```

b)

```
Scanner scan = new Scanner(System.in);
System.out.print("Enter a whole number: ");
int num = scan.nextInt();
if (num % 2 = 0)
    System.out.println("Your number is even.");
else
    System.out.println("Your number is odd.");
```

1) A. Write a loop that prints the numbers from 1 to 10 with their squares, like this:

```
1       1
2       4
3       9
4       16
5       25
6       36
7       49
8       64
9       81
10      100
```

B. How would you make the loop do the same output backwards (from 10 to 1)?

2) Write a while loop that counts from 1 to 20 by 2's on one line:

```
2 4 6 8 10 12 14 16 18 20
```

3) What is the output of each of the following loops?

Example 1:

```
int count = 4;
while (count > 0)
{
  System.out.println(count);
  count--;
}
```

Example 2:

```
int count = 1;
while (count < 5)
{
  System.out.println(count);
  count++;
}
```

Example 3:

```
int count = 3;
while (count <= 1)
{
  System.out.println(count);
  count++;
}
```

Example 4:

```
int count = 3;
while (count >= 1)
{
  System.out.println(count);
  count--;
}
System.out.println(count);
```

Example 5:

```
int count = 9;
while (count <= 10 && count > 4)
{
  System.out.println(count);
  count--;
}
```

Example 6:

```
int x = 1, y = 3;
while (x < 5 || y > 0)
{
  System.out.println(x++ +
        ", " + --y);
}
System.out.print("x: " + x);
System.out.println(" y:" + y);
```

4) a. Write a program that requests a final grade. Use a do-loop to request the grade continuously as long as the grade entered is invalid. A grade is invalid if it is less than 0 or greater than 100. After a valid grade is entered, display it on the screen.
4) b. Modify the above program so that the user can cancel by entering the value 999.
4) c. Modify the program in 1. a. so that the user has only 5 tries to enter the grade. After 5 tries, the program terminates.

5) a. For this program, use either a while-loop or a do-loop, whichever you think is most efficient. Write a program that records scientific test results (they'll have decimal values) from the user. As each test result is entered, add it to a total. After all the test results have been entered, display the total. You don't know how many test results they'll enter, so after each result is entered, prompt the user with a question such as "Would you like to enter another test result? (Y/N)". The user can answer "Yes" or "No" too this question, or even just "Y" or "N". To capture this, we would use the Scanner's next() method to grab only the first word of the user input:

```
String answer = in.next();
```

However, we can make this program more efficient if we use a character value instead of a string, and just compare the first letter of the user's input (Y or N). There is a method in the String class called charAt(index). You give charAt() a string index (the position number, where the first character is position 0, the second position 1, etc) of the character you'd like to have and it will return that character at the specified index as a char value. For example:

```
"hello".charAt(0) // returns 'h'
"hello".charAt(1) // returns 'e'
"hello".charAt(2) // returns 'l'
"hello".charAt(4) // returns 'o'
"hello".charAt(5) // would give an error because there is no index 5
```

So since we only what the first character that the user types, we can use:

```
char keepGoing = 'Y';  // initialize to yes
...  // code code code
keepGoing = in.next().charAt(0);
```

Next, we want to see if the user says 'Y' to our prompt, meaning they'd like to enter another test result. So our loop condition could be something like keepGoing == 'y' || keepGoing == 'Y' because we don't know if the user will type an upper-case or a lower-case answer. If you prefer, you can use one of the String class's methods toUpperCase() or toLowerCase() to convert the user's answer to upper- or lower-case, and then compare. For example, I will use upper-case comparisons:

```
keepGoing = in.next().toUpperCase().charAt(0);
```

Then my loop condition would be keepGoing == 'Y'.
Add this functionality to your program, so your user can enter as many test results as they'd like.

1. Using loop statement write a program that prompts the user to enter 5 integer values:

i. Find and display the Largest and Smallest number

ii. Display whether the number is Even or Odd

iii. Display whether the number is negative, positive or zero

iv. Calculate the Sum and Average of the Even numbers

2. Write a program that randomly generates an integer between 0 and 100, inclusive.

The program prompts the user to enter a number continuously until the number matches the randomly generated number. For each user input, the program tells the user whether the input is too low or too high, so the user can choose the next input intelligently.