AP Computer Science

‘18-’19 Summer Assignment

NAME:__________________________
class APCompSci{

    public static void main(Strings[ ] args){

        System.out.println("Register in google classroom with class code - y18jgj");

        //checks the year the student took Intro to Programming
        if(student.introDate == 2019){
            System.out.println("Do Section II only");
        }else if(student.introDate < 2019){
            System.out.println("Complete Section I and II");
        }

        System.out.println("Two dates over the summer will be posted in the classroom for when I will be in the school for assistance");

        System.out.println("ALL work must be done in this packet, even if completed at a prior time");

        if(student.hasQuestion()){  
            System.out.println("Step 1: consult the book, link posted in the google classroom");
            System.out.println("Step 2: consult youtube");
            System.out.println("Step 3: email tgrossi@mtoliveboe.org include the link to the search results you have used. Not the individual video, the page with a list of all the videos");
        }
    }
}
Section I
Lesson 2

1. What are the three main types of variables used in Java and what are they used to store?

2. What type of variable would you use to store your name?

3. What type of variable would you use to store the square root of 2?

4. What type of variable would you use to store your age?

5. Write a single line of code that will create a double precision variable called p and store 1.921 \times 10^{-18} in it.

6. Write a single line of code that will create an integer variable called i and store 407 in it.

7. Write a single line of code that will create a String variable called my_name and store your name in it.

8. Write a line of code that will declare the variable count to be of type int. Don’t initialize.

9. Write a line of code that initializes the double precision variable bankBalance to 136.05. Assume this variable has already been declared.

10. Which of the following are legal variable names?
    a. scooter13
    b. 139_scooter
    c. homer-5
    d. ;mary
    e. public doubled
    f. double ab c

11. Which of the following is the most acceptable way of naming a variable. Multiple answers are possible.
    a. GroovyDude
    b. GROOVYDUDE
    c. groovyDude
    d. Groovydude
    e. groovy_dude
    f. groovydude

12. Comment on the legality of the following two lines of code.
    double dist = 1003;
    int alt = 1493.86;
    int num = 1_2_3;
● Create a Class named “Lesson 2.1”
● Class Objective:
  ○ Create variables holding the values of your age, height, weight, shoe size, GPA. ← May all be fake.
  ○ Use appropriate variable names.
  ○ Use appropriate data types.

**Example Output**

```java
// PrintAndVar
Age = 25
Height = 72 feet
Weight = 150 lbs
GPA = 3.52
```

The more aesthetic your output the better. This is the bare bones basic output! Be creative. You may make variables which hold values other than the given attributes.

● Create a 2nd class names “Lesson 2.1”, no quotes. Duh… In the same project
● Find athletes or people who have legitimate stats
● Class Objective:
  ○ Create output using your own players/person and their stats.
  ○ Must use variables for any numbers
  ○ Must have numbers in stats

**Example Output**

```java
// Mr. Grossi - Professional Monkey Trainer
Monkeys Trained - 100+/year
Best Monkey Trick - Graduating High School
Favorite Monkey Trained - Bill Loon
```
Exercise on Lesson 3

1. Write code in which a String variable s contains “The number of rabbits is”. An integer variable argh has a value of 129. Concatenate these variables into a String called report. Then print report. The printout should yield:
   The number of rabbits is 129.
   Note that we want a period to print after the 9.

2. What is the output of System.out.println(p.toUpperCase()); if p = “Groovy Dude”?

3. Write code that will assign the value of “Computer Science is for nerds” to the String variable g. Then have it print this String with nothing but “small” letters.

4. What will be the value of c?
   String c;
   String m = “The Gettysburg Address”;
   c = m.substring(4);

5. What will be the value c?
   String b = “Four score and seven years ago,”;
   String c = b.substring(7, 12);

6. What is the value of count?
   int count;
   String s = “Surface tension”;
   count = s.length();

7. Write code that will look at the number of characters in String m = “Look here!”: and then print
   “Look here!” has 10 characters.
   Use the length() method to print the 10 … you must also force the two quotes to print.

8. How would you print the following?
   All “good” men should come to the aid of their country.

9. Write code that will produce the following printout using only a single println().
   Hello
   Hello again

10. Write code that will produce the following printout.
    A backslash looks like this \, … right?
11. What is output by the following?
    String pq = “Eddie Haskel”;
    int hm = pq.length();
    String ed = pq.substring(hm - 4);
    System.out.println(ed);

12. Which character is at the 5th index in the String “Herman Munster”? 

Project... Name that Celebrity

Create a new project called NameThatCelebrity in which only partially recognizable names of celebrities are to be produced. In a real implementation of this game, the idea is for a contestant to be able to guess the real name of the celebrity after the first two and last three letters are dropped from the name. We have been given the task of testing the feasibility of this idea by producing the following printout:

    Allan Alda>>>lan A
    John Wayne>>>hn Wa
    Gregory Peck>>>egory P

Begin your code within the main method as follows:

    String s1 = “Allan Alda”;
    String s2 = “John Wayne”;
    String s3 = “Gregory Peck”;

Apply the length and substring methods to these Strings to produce the above printout.
Lesson 3.2 - Strings

Directions: Create a single `System.out.print()` for each output, emphases on escape characters.

1. `output = a\b\c\"d"
2. `output = \t is a tab, \n is a new line, \" prints a “quote”
3. `output = “line one”
   \line two\`
4. `output = \ denotes a single line comment
   \*denotes a multiline comment\`
5. `output = "\\""
   \\
   \\
   \\

Directions: In Eclipse declare the given String, word, for each problem. Modify the given variable with only utilizing `substring(int x), substring(int x, int y), length(), +, toUpperCase(), toLowerCase(), escape characters [ \, \n, \t, ‘ ]`

6. `String word = Birthday
   output = BIRTHDAY`
7. `word = it’s my party
   output = it’s a “PARTY”`
8. `word = “whose a whats it”
   output = WHOSE
   is WHAT`
9. `word = Every Way The Wind Blows
   output = every WAY the \WIND\ blows 4`
10. `word = Peter Piper Picked A Peck Of Picked Peppers
    output = A peck of pickled peppers Peter Piper picked`
11. `word = word has 4 letters
    output = “4” letters has “9” letters`
12. `word = if SUBSTRING is used
    output = substring is 9`
13. `word = Jim, Jacky, Johnny, Jill
    output = jim\3
    JACKY\5
    johnny\6
    JILL\4`
Lesson 4.1 - Numeric Variables

Unless otherwise directed in the following problems, state what is printed. Some of these problems may have incorrect syntax and in those cases you should answer that the code would not compile.

1. ```java
   int h = 103;
   int p =5;
   System.out.println(++h + p);
   System.out.println(h);
```

2. Give three code examples of how to increment the integer j by 1.

3. ```java
   double def;
   double f = 1992.37;
   def = f;
   System.out.println(def);
```

4. Write a single line of code that will print the integer variable zulu and then decrement its value by 1.

5. ```java
   int a = 100;
   int b = 200;
   b/=a;
   System.out.println(b + 1);
```

6. Write a single line of code that uses the compound operator, -=, to subtract p-30 from the integer value v and store the result back in v.

7. Write a single line of code that does the same thing as #6 but without using -=.

8. ```java
   int p = 40;
   int q = 4;
   System.out.println(2 + 8 * q / 2 - p);
```

9. ```java
   int sd = 12;
   int x = 4;
   System.out.println( sd%(++x ) );
   System.out.println(x);
```

10. ```java
    int g;
    3 = g;
    System.out.println(++g*79);
    What is the result?
```

11. On a single line of code declare m, b, and f to be double and on that same line initialize
them all to be 3.14.

12. On a single line of code declare x, y, and z all to be of integer type.

13. ```
int m = 36;
int j = 5;
m = m / j;  //new m is old m divided by j
System.out.println(m);
``` What’s printed?

14. ```
System.out.println(3/4 + 5*2/33 –3 +8*3);
``` What’s printed?

15. What is the assignment operator?

16. Write a statement that stores the remainder of dividing the variable i by j in a variable named k.

17. ```
int j = 2;
System.out.println(7%3 + j++ + (j – 2) );
``` 

18. Show three different ways to decrement the variable j.

**Project - Cheating on Your Arithmetic Assignment**

Create a new class called Arithmetic Assignment that will calculate and print the results of the following arithmetic problems:

```
79 + 3 * (4 + 82 –68) – 7 + 19
(179 +21 +10) / 7 + 181
10389 * 56 * 11 + 2246
```

The printout should look like the following:

```
79 + 3 * (4 + 82 - 68) - 7 + 19 = 145
(179 +21 +10) / 7 + 181 = 211
10389 * 56 * 11 + 2246 = 6401870
```
Lesson 5 - Casting/Constant

Directions: Unless otherwise instructed in the following problems, state what gets printed.

1. Write code that will create a constant E that’s equal to 2.718.

2. Write the simplest type constant that sets the number of students, NUM_STUDENTS, to 236.

3. What’s wrong, if anything, with the following code in the main method?
   ```java
   final double Area;
   Area = 203.49;
   ```

4. What’s printed
   ```java
   int cnt = 27.2;
   System.out.println(cnt);
   ```

5. What’s printed
   ```java
   double d = 78.1;
   int fg = (int)d;
   System.out.println(fg);
   ```

6. Is the following legal?
   ```java
   double f4 = 22;
   ```

7. The following code stores a 20.0 in the variable j:
   ```java
   double j = 61/3;
   ```
   What small change can you make to this single line of code to make it produce the “real” answer to the division?

8. ```java
   System.out.println( (double)(95/9) );
   ```

9. ```java
   System.out.println(4 + 6.0/4 + 5 * 3 - 3);
   ```

10. ```java
    int p = 3;
    double d = 10.3;
    int j = (int)5.9;
    System.out.println(p + p * d - 3 * j);
    ```
The following code applies to 12 – 15:
```java
int dividend = 12, divisor = 4, quotient = 0, remainder = 0;
int dividend2 = 13, divisor2 = 3, quotient2 = 0, remainder2 = 0;
quotient = dividend / divisor;
remainder = dividend % divisor;
quotient2 = dividend2 / divisor2;
remainder2 = dividend2 % divisor2;
```

12. `System.out.println(quotient);`
13. `System.out.println(remainder);`
14. `System.out.println(quotient2);`
15. `System.out.println(remainder2);`

16. Write a line of code in which you divide the double precision number d by an integer variable called i. Type cast the double so that strictly integer division is done. Store the result in j, an integer.

17. Suppose we have a line of code that says
```java
final String M = "ugg";
```
Later in the same program, would it be permissible to say the following?
```java
M = "wow";
```

18. Is the following code legal? If so, what is printed? If not, why?
```java
int k = 7;
k*=.5;
System.out.println(k);
```

Project:

Determine the output of the following problems by hand, then check your answers in Eclipse. Reminder: All problems on tests/quizzes will be done by hand, please ensure you can complete the logic and get the exact correct answer. 5 and 5.0 are different answers. KNOW THE DIFFERENCE!
```java
double d1 = 37.9;
double d2 = 1004.128;
it i1 = 12;
it i2 = 18;
```

Problem 1: 57.2 * (i1 / i2) + 1
Problem 2: 57.2 * ((double)i1 / i2) + 1
Problem 3: 15 – i1 * (d1 * 3) + 4
Problem 4: 15 – i1 * (int)(d1 * 3) + 4
Problem 5: 15 – i1 * ((int)d1 * 3) + 4
1. Write code that will take the square root of x and store the result in y.

2. Write code that will multiply the value of the integer j times the absolute value of the integer m and then store the result in the integer k.

3. Is the following legal? If not, what would you do to make it legal?
   ```java
   int k = Math.abs(-127.5);
   ```

4. Write a statement that will print the result of $2^{1.5}$.

5. ```java
   System.out.println( Math.ceil(-157.2) );
   ```

6. ```java
   System.out.println( Math.floor(-157.2) );
   ```

7. ```java
   System.out.println( Math.ceil(157.2) );
   ```

8. ```java
   System.out.println( Math.floor(157.2) );
   ```

9. ```java
   System.out.println( Math.round(-157.2) );
   ```

10. ```java
    System.out.println( Math.ceil(-157.7) );
    ```

11. ```java
    System.out.println( Math.ceil(157) );
    ```

12. ```java
    System.out.println( Math.ceil(157.7) );
    ```

13. Write a statement that will print the natural log of 18.... same as \( \ln(18) \) on a calculator.

14. Write a line of code that multiplies double p times \( \pi \) and stores the result in b.
Project… Compute This
Create a new project called ComputeThis having a class called Tester. The main method of Tester should calculate the value of the following formulas and present the answers as shown.

\[ d1 = 3\pi\sin(187^\circ) + |\cos(122^\circ)| \]
//Remember that the arguments of \(\sin\) and \(\cos\) must be in radians.

\[ d2 = (14.72)^{3.801} + \ln 72 \]
//\(\ln\) means log base e

The output of your code should appear as follows:

\[ d1 = -0.618672237585067 \]
\[ d2 = 27496.988867001543 \]

Verify these answers with a calculator.
Lesson 7.1 - Scanner/String API/Math API

1. **Create a program which:**
   a. Prompts a user for their name.
   b. Tells the user how many characters are in their name and asks how many they would like to print out.
   c. Print out that many letters

   ![Console](image1)
   Please enter your whole name.
   Mr. Grossi Esq.
   Your name has 15 characters in it, how many would you like me to print?
   5
   Mr. G

   ![Console](image2)
   Please enter your whole name.
   I love programming!!!
   Your name has 21 characters in it, how many would you like me to print?
   11
   I love prog

2. **Create a program to solve for the c using Pythagorean's Theorem**
   a. **Example 1:**

   Please enter your A value
   3
   Please enter your B value
   4
   \[ \text{square root of } 3.0 \text{ squared + } 4.0 \text{ squared} = 5.0 \]

   b. **Example 2:**

   Please enter your A value
   6.2
   Please enter your B value
   97.1
   \[ \text{square root of } 6.2 \text{ squared + } 97.1 \text{ squared} = 97.29773892542416 \]
3. **Create a program which solves the Quadratic Equation**

\[ x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \]

a. Example output:

```
> Console  
> <terminated> FunWithScanners [Java Application]
> Please enter the A value.
> 1
> Please enter the B value.
> 2
> Please enter the C value.
> 1
> Plus = -1.0
> Minus = -1.0
```

b.

```
> Console  
> <terminated> FunWithScanners [Java Application]
> Please enter the A value.
> 6.8
> Please enter the B value.
> -9.1
> Please enter the C value.
> 2.1
> Plus = 1.0418037028668878
> Minus = 0.2964315912507593
```

4. **Use the String API to determine at which index your desired substring occurs in your given string**

a. Examples:

```
> Console  
> <terminated> FunWithScanners [Java Application]
> Please enter a sentence.
> How are you today?
> What letter shall I find?
> a
> Your letter occurs at index 4
```

```
> Console  
> <terminated> FunWithScanners [Java Application]
> Please enter a sentence.
> Get schwifty with it!!
> What letter shall I find?
> wif
> Your letter occurs at index 7
```
Lesson 8 - Boolean Activity

In problems 1 – 5 assume the following:

```java
int z = 23, x = -109;
double c = 2345.19, v = 157.03;
boolean a = false, s = true;
```

1. ```java
   boolean gus = (x > 0) && (c = = v);
   System.out.println(!gus);
   ```

2. ```java
   System.out.println(a | | s);
   ```

3. ```java
   System.out.println( ( (-1 * x) > 0) && !a );
   ```

4. ```java
   boolean r = z = =x;
   System.out.println( r | | false );
   ```

5. ```java
   System.out.println( z!=x );
   ```

6. Complete the following table

| a     | b     | (!a && b) | a     | b     | (a | | !b) |
|-------|-------|-----------|-------|-------|---------|
| false | false |           | false | false |         |
| false | true  |           | false | true  |         |
| true  | false |           | true  | false |         |
| true  | true  |           | true  | true  |         |

7. Assume b, p, and q are booleans. Write code that will assign to b the result of AND-ing p and q.

8. Assign to the boolean variable w the result of OR-ing the following two things:
   A test to see if x is positive: A test to see if y equals z:

9. What are the two possible values of a boolean variable?
10. Write a test that will return a true if a is not equal to b. Assume a and b are integers. Store the result in boolean kDog.

11. Write the answer to #10 another way.

12. What is the Java operator for boolean **AND-ing**?

13. What is the Java operator for boolean **OR-ing**?

14. System.out.println( (true && false) || (true && true) || false );

15. System.out.println(true && true || false);

16. System.out.println(true || true && false);

17. System.out.println(false || true && false);

18. System.out.println(false && true || false);
Lesson 9 - If Statements

Use the following code for problems 1 – 10 and give the value of true_false for each:

```java
int i = 10, j = 3;
boolean true_false;
```

1. `true_false = (j > i);`
2. `true_false = (i > j);`
3. `true_false = (i == j);`
4. `true_false = (((j <= i) || (j >= i)));`
5. `true_false = ((i > j) && (j == 0));`
6. `true_false = (((j < 50) || (j != 33)));`
7. `true_false = (!((j >= 0) || (i <= 50)));`
8. `true_false = (!(!(!true)));`
9. `true_false = (5 <= 5);`
10. `true_false = (j != i);`

11. Write a statement that will store a true in boolean b if the value in the variable m is 44 or less
12. Write a statement that will store a false in boolean b if the value in r is greater than 17.
13. What is returned by the following expression?

   (Recall that the precedence order of logical operators is !, &&, and finally | |.)

   `!( (2>3) || (5==5) && (7>1) && (4<15) || (35<=36) && (89!=34) )`

In problem 14 – 16 what is the output?

14. String s1 = “school BUS”;
    if ( s1.equals(“school bus”) )
        System.out.println(“Equal”);
    else
        System.out.println(“Not equal”);

15. String s1 = “school BUS”;
    if ( s1.equalsIgnoreCase(“school bus”) )
        System.out.println(“Equal”);
    else
        System.out.println(“Not equal”);

16. int j = 19, m = 200;
    if (j == 18)
        m++;
    j++;
    System.out.println(m);
    System.out.println(j);

17. Write a statement that will store a false in boolean b if the value in g is not equal to 34.
18. Write a statement that will store a true in boolean b if integer k is even, false if it is odd.

19. Write a program that inputs a String from the keyboard after the prompt, “Enter your password”. If it’s entered exactly as “XRay”, printout “Password entered successfully.”; otherwise, have it printout “Incorrect password.”

20. What is output by the following “nested ifs” code?
```java
int k = 79;
if (k>50) {
    if (k<60){
        System.out.println("One");
    } else {
        System.out.println("Two");
    }
} else {
    if (k>30) {
        System.out.println("Three");
    }else {
        System.out.println("Four");
    }
}
```
Lesson 11 - for loops

Directions: In each problem below state what is printed unless directed otherwise.

1. `int j = 0;
   for (int g = 0; g < 5; g++)
       j++;
   System.out.println(j);

2. `int s = 1;
   for (int j = 3; j >= 0; j--) {
       s = s + j;
   `
3. int p = 6;
   int m = 20, j;
   for (j = 1; j < p; j++) {
       m = m + j * j;
   }
   System.out.println(m);

4. double a = 1.0;
   for (int j = 0; j < 9; j++) {
       a *= 3;
   }
   System.out.println(j);

5. for (int iMus = 0; iMus < 10; iMus++) {
       int b = 19 + iMus;
   }
   System.out.println(b);

6. double d = 100.01;
   int b = 0;
   for (int iMus = 0; iMus < 10; iMus++)
       b = 19 + iMus;
   d++;
   System.out.println(d);

7. Write a for-loop that will print the numbers 3, 6, 12, and 24

8. Write a for-loop that will print the numbers 24, 12, 6, 3
9. int k = 0;
   for(int j = 0; j <= 10; j++) {
      if (j == 5) {
         break;
      } else {
         k++;
      }
   }
   System.out.println(k);

10. What is the name of the part of the parenthesis of a for-loop that terminates the loop?

11. What is the value of j for each iteration of the following loop?
    int i, j;
    for( i = 10; i <= 100; i = i + 10)
        j = i / 2;

12. What is the value of r after the following statements have executed?
    int r, j;
    for (j = 1; j < 10; j = j * 2)
        r = 2 * j;

13. What is the worst sin you can commit with a for-loop (or any loop for that matter)?

14. How many times does the following loop iterate?
    for (p = 9; p <= 145; p++) { . . . }

| 1. What is output? | int sum=0;
|---------------------| for (int k=0; k<5; k++) {
| A. 0                |   sum+=k;
| B. 10               | }                
| C. 15               | System.out.println(sum); |
| D. 5                |                      |
| E. None of these    |                      |

| 2. What is output? | double kk = 3;
|---------------------| for( j = 0; j <= 100; j++) {
| A. 66               |   kk = kk + Math.pow(j, 2); 
| B. 100              | } |

1. What is output?
A. 0
B. 10
C. 15
D. 5
E. None of these
<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
<th>Code</th>
</tr>
</thead>
</table>
| 3. What is the final value of `p`? | A. 10 B. 4 C. 5 D. 12 E. None of these | ```java
double p = 0;
for(int m = 10; m > 6; --m) {
    if(m = 7) {
        p = p+m;
    } else {
        ++p;
    }
}
``` |
| 4. Which of the following will print the set of odd integers starting at 1 and ending at 9? | A. `for` (int `j` = 0; `j` <= 9; `j`++) { `System.out.println(j);` } | ```java
for(int j = 1; j < 10; j = j + 2) { `System.out.println(j);` } ``` |
| 5. What is output? | A. 4950 B. 101 C. 100 D. Nothing, it’s an endless loop E. None of these | ```java
double x = 0;
for(int b = 0; b <= 101; b++) {
    x = x + 1;
    b--;
}
`System.out.println(x);` ``` |
| 6. What is output? | A. 5 6 B. 6 6 C. 5 10 D. 5 5 E. None of these | ```java
int p, q = 5;
for(p = 0; p < 9; p++) // notice the semicolon
    q = q + 1;
`System.out.println(p + " " + q);` ``` |
| 7. What is output? | A. 98 B. 3939 C. 109 D. 4039 E. None of these | ```java
int j, k; int count = 0;
for(j = 0; j < 4; j++) {
    for(k = 0; k < 10; k++) {
        count++;
    }
}
`System.out.println(count--;);
`System.out.println(count);` ``` |

**for loop Projects**: All projects should be created in their own class
1. Print out each letter of a user inputted word/sentence on a new line

2. Have the user enter a sentence.
   a. Reprint the sentence but do not print the letters with a vowel immediately following it

3. Print all the multiples of 7 that are between 1 and 187.

4. Have the User enter a sentence.
   a. Print out every other letter capitalized and lowercased.
   b. Example Output: HoW ArE YoU DoInG

5. User enters a sentence and an integer(x)
   a. Reprint the sentence but do not print the first x vowels in the sentence

Lesson 12 - While/Do While Loops

1. Show the basic skeleton of a while loop.

2. Show the basic skeleton of a do-while loop.

3. Implement the following for-loop as a while loop.
```java
int m;
for (m = 97; m <= 195; m++) {
    k = k * k + 3 * m;
    p = p + m +1;
}
```

4. Implement the following for loop as a do-while loop.
```java
for (int v = 2; v <= 195; v*=3){
    k = k * k + 3 * v;
    q = Math.sqrt(q + v +1);
}
```

5. What is the loop control expression in the code segment below?
```java
while (!done){
    if (i < 1){
        done = true;
    }
    i--;
}
```

6. What is the error in the code segment below?
```java
do;{
    if (i < 1){
        done = true;
    }
    i--;
}while (!done);
```

7. How many times will the loop below iterate?
```java
int j = 0;
while(j < 50){
    System.out.println("Hello World!");
}
```

8. How many times will the loop below iterate?
```java
int j = 25;
while (j <= 100 | | j >= 25){
    System.out.println("Temp variable =" + j);
```
9. Identify the error(s) in the code below:
   ```java
   j = 155
   while (!done){
       if (j <= 25)
           done = true;
       j = j - 5;
   }
   ```

10. What will be the output of the following code:
    ```java
    int i = 0, j = 0;
    while(i <= 3){
        for(j = 0; j <=2; j++){
            System.out.println(i + "," + j + " ");
        }
        i++;
    }
    ```

11. What command would you use if something unusual happens in one of your loops and you wish to exit prematurely (even before the control expression says you can)?

12. What loop structure would you use if you want to guarantee that a test condition of the control expression be tested before the block of code inside the loop could execute?

13. What is printed when the following code runs?
    ```java
    double m = 92.801;
    int j = 0;
    do{
        j = j + 2;
        if (j > -100)
            Continue;
        m+=3;
    }while(j < 6);
    System.out.println(m);
    ```
14. Write a program that will prompt the user to enter an integer. The program should square the number and then print the squared number. Repeat this process until 0 is entered as input. Use a while-loop to do this.

15. Which of the following imitates the action of the for-loop to the right?
   a. `int j = 0;
      while(j<100){
         j++;
         ...some code...
      }
   ` for(int j=0; j<100; j++)
   {
      ... some code ...
   }
   b. `int j = 0;
      while(j<100){
         ...some code...
         j++;
   `
c. int j=0;
   do{
      ...some code...
      j++;
   }while(j<100);
d. Both B and C
e. Both A and B

16. How many times does this loop iterate?
   a. 0
   b. 1
   c. 2
   d. Infinite number of times
   e. Both A and B

17. What is the output if the initial value of k and p are both 0?
   a. 0
   b. 3
   c. 2
   d. 1
   e. None of these

18. How many times does this loop iterate if the value of the boolean b is not known?
   a. None
   b. 2
   c. Can't be determined
   d. Infinite number of times
   e. None of these

19. What type of loop would you use if the condition for staying in the loop needs to be tested before the loop iterates?
   a. for-loop
   b. while-loop
   c. do-while loop
   d. All of these
   e. Both A and B

For exercises 1 to 15, indicate the output that will be produced. Assume the following declarations are made just before each exercise. That is, assume these initializations are in effect at the beginning of each problem: Please excuse the wrap-around.

```java
final int MIN = 10,
final MAX = 20;
int num = 15;

1. while (num < MAX){
       System.out.println (num);
```
num = num + 1;
}

2. while (num < MAX){
    num = num + 1;
    System.out.println (num);
}

3. do{
    num = num + 1;
    if (num*2 > MAX+num)
        System.out.println (num);
}while (num <= MAX);

4. while (num < MAX){
    System.out.println (num);
    num = num - 1;
}

5. while (num > MIN){
    System.out.println (num);
    num = num - 1;
}

6. while (num < MAX){
    System.out.println (num);
    num += 2;
}

7. while (num < MAX){
    if (num%2 == 0)
        System.out.println (num);
    num++;
}

8. do{
num = num + 1;
System.out.println (num);
}while (num <= MAX);

9. for (int value=0; value >= 7; value++)
    System.out.println (value);

10. for (int value=7; value < 0; value--)
    System.out.println (value);

11. for (int count1=1; count1 <= 5; count1++){
    for (int count2=1; count2 <= 5; count2++)
        System.out.print(count1*count2 + " ");
    System.out.println();
}

12. for (int value=num; value <= MAX; value++)
    System.out.println (value);

13. for (int value=num; value <= MAX; value++)
    if (value%4 != 0)
        System.out.println (value);

14. for (int count1=1; count1 <= 7; count1++){
    for (int count2=1; count2 <= 5; count2++)
        System.out.print ("#");
    System.out.println();
}
15. for (int value=1; value >= 20; value+=4)
    System.out.println (value);

For exercises 16 to 29, write code segments that will perform the specified action using a while loop.

16. Verify that the user enters a positive value.

17. Verify that the user enters an even value
18. Read and print values entered by a user until a particular sentinel value is encountered. Do not print the sentinel value. Assume the sentinel value is stored in a constant called $\text{SENTINEL}$. 

19. Read values from the user, quitting when a sentinel value of 0 is entered. Compute and print the product of all values entered (excluding the sentinel value). 

20. Print the odd numbers between 1 and 100. 

21. Print the multiples of 3 from 300 down to 3. 

22. Get two values entered by user and save them as low and high, ensure that low is a smaller value than high. Print the numbers between low and high that are evenly divisible by four but not by five. 

23. Print all of the factors of a value stored in the variable $\text{number}$. Assume the value is positive. 

24. Read $x$ number of values from the user and print the lowest and highest value entered. $x$ is determined by the user. 

25. Determine and print the number of times the character 'a' appears in the String variable $\text{str}$. 

26. Print the characters stored in the String variable $\text{str}$ backwards. 

27. Print every other character in the String variable $\text{str}$ starting with the first character. 

Lesson 13 - ASCII 

1. What is the ASCII code for 'A'? 

2. What is the ASCII code for 'Z'? 

3. What is the ASCII code for 'a'? 

4. What is the ASCII code for 'z'?
5. How many letters are in the English alphabet?

6. What is the ASCII code for the character '0' (this is the number 0 and not the letter O)?

7. What is the ASCII code for the character '9'?

8. What does the following code do?
   ```java
   char c;
   for (int j = 97; j <= 122; j++) {
       c = (char)(j - 32);
       System.out.print(c);
   }
   ```

9. What does the following code do?
   ```java
   String s = "Alfred E. Neuman";
   char ch;
   for (int x = 0; x < s.length(); x++) {
       ch = s.charAt(x);
       if (ch <= 90 && (ch>=65) )
           ch = (char)(ch + 32);
       System.out.print(ch);
   }
   ```

10. Write code that will convert char a into a String.

11. Write code that will convert String p into a character. (p consists of just one letter.)

12. Is this legal?
    ```java
    char ch = 'V';
    String sd = ch;
    ```

13. Is this legal?
    ```java
    char ch = 'V';
    char x = (char)(ch + 56);
    ```

14. Is this legal?
    ```java
    char aa = "X";
    ```

15. What is printed?
    ```java
    char k = 'B';
    System.out.println(k + 3);
    ```

16. What is printed
    ```java
    char k = 'B';
    System.out.println((char)(k + 3));
    ```

17. Write code that will insure that an uppercase version of char boy is stored in char cv.
18. Write code that will insure that a lowercase version of char boy is stored in char cv.

19. If you have a character called bv, what could you do to determine if it’s a digit?

20. If you have a character called bv, what could you do to determine if it’s a letter?

21. If you have a character called bv, what could you do to determine if it’s an uppercase Character?

22. If you have a character called bv, what could you do to determine if it’s either a letter or a digit?

23. If you have a character called bv, what could you do to determine if it’s a lowercase character?

24. Describe what the following code does.
   ```java
   for(int j = 0; j <= 127; j++){
       char ch = (char)j;
       if(Character.isWhitespace(ch))
           System.out.println(j);
   }
   ```

Lesson 14 - Binary/Hex/Octal

1. Convert $3C4F_{\text{hex}}$ to decimal.

2. Convert $100011_{\text{bin}}$ to decimal.

3. Convert $637_{\text{oct}}$ to decimal.
4. Is the following code legal? If not, why? int v = 04923;

5. Is the following code legal? If not, why? int w = 0xAAFF;

6. Convert 9A4E_{hex} to decimal.

7. Convert 1011011_{bin} to decimal.

8. Convert 6437_{oct} to decimal.

9. Write code that will store 5C3B_{hex} in the integer variable a.

10. Write code that will store 3365_{oct} in the integer variable k.

11. Convert 478_{dec} to binary.

12. Convert 5678_{dec} to hex.

13. Convert 5678_{dec} to octal.

14. Multiply 2C6_{hex} times 3F_{hex} and give the answer in hex.

15. Add 3456_{oct} and 745_{oct} and give the answer in octal.

16. What is the decimal equivalent of A_{hex}?

17. What is the decimal equivalent of 8_{hex}?

18. What is the base of the hex system?

19. How do you write 16_{dec} in hex?
20. What is the base of the binary system?

21. Add these two binary numbers: 1111000 and 1001110.

22. Add these two binary numbers: 1000001 and 1100001

23. Explain the following “joke”: “There are only 10 types of people in the world... those who understand binary and those who don’t.”

24. Suppose you have String s that represents a number that you know is expressed in a base given by int b. Write code that will convert this into an equivalent decimal based integer and store the result in int i.

25. Show code that will convert 9322gf33 into String s that is the equivalent in base 28.

26. Add 3FA6hex to E83Ahex and give the answer in hex.

27. Multiply 7267oct times 4645oct and give the answer in octal.

28. Add 2376oct to 567oct and give the answer in octal.

29. Multiply 3Ehex times 5Bhex and give the answer in hex.

30. What is printed by int i = 0b1001; System.out.println(i); ?

Lesson 20 - Classes

1.

```java
double length = 44.0;
int width = 13;
Rectangle myRect = new Rectangle(length, width);
```

a. Identify the class
b. Identify the object
c. What type of parameter(s) are passed to the constructor?

2. Write out the signature for the constructor of the Rectangle class from #1 above.

3. Suppose a constructor for the Lunch class is as follows:
   ```java
   public Lunch(boolean diet, int cal){
       diet_yes_no = diet;
       calories = cal;
   }
   ```
   Write appropriate code that will create a Lunch object called yummy5. Tell the constructor that, yes, you are on a diet, and the number of calories should be 900.

4. ```java
   BankAccount account39 = new BankAccount(500.43);
   ```
   a. Identify the class
   b. Identify the object
   c. What type of parameter(s) are passed to the constructor?

5. A class is like a ________. An object is like a ________.
   Fill in the blanks above using the word “cookie” and “cookie cutter”.

6. What’s wrong (if anything) with the following constructor for the School class?
   ```java
   public void school(int d, String m)
   {
    ... some code ...
   }
   ```

7. Which of the following is a correct association?
   a. One class, many objects
   b. One object, many classes

8. Which must exist first?
   a. The class
   b. The object

9. Is the following legal? If not, why?
   ```java
   //Constructor
   public House(int j, boolean k)
   {
    ...some code...
   }
   ```
   ```java
   //This code is in main of Tester class
   int p = 3, q = 9;
   House myHouse = new House(p, q);
   ```
10. //Constructor
    public Band(int numMembers, int numInstruments, String director, double amount){
       //...code...
    }

    //Main class
    Band ourBnd = new Band(mem, instrmnts, "Mr. Perkins", budget);

    What should be the data types of:
    a. mem
    b. instrmnts
    c. budget

11. public class BibleStory{
       public int var1;
       public double var2;
       public String sss;

       public BibleStory(String x, int y, double z) {
          //...some code...
       }

       public void Samson(double zorro) {
          //...some code...
       }

       public String getDelilah() {
          //...some code...
       }
    }

12. From the BibleStory class above, write the signature of the constructor.

13. From the BibleStory class above, what is/are the instance field(s).

14. From the BibleStory class above, write the signature(s) of the all the method(s).

14. Write code that instantiates an object called philistine from the BibleStory class. Pass the following parameters to the constructor:
   The integer should be 19, the String “Ralph”, and the double 24.18.
15. Assume an object called gravy has been created from the BibleStory class. Write code that will set the state variable var2 to 106.9 for the gravy object.

16. Write code that will print the value of the BibleStory data member, sss. Assume you have already created an object called bart.

17. Again, assume we have an object called bart instantiated from the BibleStory class. What should you fill in for <#1> below in order that sss be stored in the variable jj?

<#1> jj = bart.sss;

18. Create a class in Eclipse called Trail. It should have:
   ● Instance fields x and y that are integers.
   ● Instance field s should be a String.
   ● The constructor should receive a String which is used to initialize s. The constructor should automatically set x and y both equal to 10.
   ● There should be a method called met that returns a String that is equivalent of x* y. This method receives no parameters.

19. Consider a method whose signature is:

   ```java
   public double peachyDandy(int z){...some code}
   ```

   Write code that would call this method (assume we have an object name zippo). Also assume that this code will be placed in the main method of a Tester class and that the peachyDandy method is in some other class.

20. Refer to the information in 19 above. What's wrong with trying to call this method in the following fashion?

   ```java
   double hamburger = zippo.peachyDandy(127.31);
   ```

---

**Project ... Overdrawn at the Bank**

Create a class called BankAccount. It should have the following properties:

1. Two state variables:
   a. double balance… This is how much money is currently in the account.
   b. String name…The name of the person owning the account.

2. Constructor should accept two parameters.
   a. One should be a double variable that is used to initialize the state variable, balance.
   b. The other should be a String that is used to initialize the state variable, name.
3. Two methods:
   a. deposit…returns nothing…accepts a double that is the amount of money being deposited. It is added to the balance to produce a new balance.
   b. withdraw…returns nothing…accepts a double that is the amount of money being taken out of the account. It is subtracted from the balance to produce a new balance.

Create a Tester class that has a main( ) method. In that method you should input from the keyboard the amount (1000) of money initially to be put into the account (via the constructor) along with the name of the person to whom the account belongs.
   1. Use these two pieces of data to create a new BankAccount object called myAccount.
   2. Call the deposit method to deposit $505.22.
   3. Print the balance state variable.
   4. Call the withdraw method to withdraw $100.
   5. Print the remaining balance in this form:
      The Sally Jones account balance is, $1405.22

Lesson 21 - More Classes

Problems 1 – 5 refer to the following code (assume that equals is not an explicit, method of this class):

```
MoonRock myRock = new MoonRock(3, "Xeon");
MoonRock yourRock = new MoonRock(2, "Kryptonite");
MoonRock ourRock = new MoonRock(3, "Xeon");
MoonRock theRock;
theRock = ourRock;
```
1. Does `theRock.equals(ourRock)` return a true or false?

2. Does `theRock.equals(yourRock)` return a true or false?

3. Does `theRock.equals(myRock)` return a true or false?

4. Does `myRock = = ourRock` return a true or false?

5. Does `myRock.equals(yourRock)` return a true or false?

Problems 6 – 11 refer to the following code:

```java
public class Weenie{
    public Weenie( ){
        <some code>
    }
    public String method1(int jj){
        <some code>
    }
    private void method2(String b){
        <some code>
    }
    public int method3( ){
        <some code>
    }
    public double x;
    public int y;
    private String z;
}
```

Now suppose from within a different class we instantiate a Weenie object, oscarMayer. All of the code in questions 6 – 11 is assumed to be in this other class.

6. Is `int zz = oscarMayer.method1(4);` legal? If not, why?


8. Is `int cv = oscarMayer.method3( );` legal? If not, why?

9. Is `int cv = oscarMayer.method3(14);` legal? If not, why?

10. Is `oscarMayer.z = "hotdog";` legal? If not, why?

11. Assume the following code is inside method1:
    ```java
    method2("BarBQ");
    ```
12. Instantiate an object called surferDude from the Surfer class using two separate lines of code. One line should declare the object and the other line should instantiate it. (Assume no parameters are sent to the constructor.)

13. Which of the following is correct? (Assume beco is an object having a method (method33) that receives a Circle parameter.)
   - Circle cir5 = new Circle(10);
     beco.method33(cir5);
   - beco.method33( new Circle(10) );
   - Both a and b

14. What is the value of balance after the following transactions?

   //Refer to the BankAccount class you created on p 15-8
   BankAccount acc = new BankAccount(10, "Sally");
   acc.deposit(5000);
   acc.withdraw(acc.balance / 2);

15. What’s wrong with the following code?
   BankAccount b;
   b.deposit(1000);

16. What’s wrong with the following code?
   BankAccount b = new BankAccount(32.75, "Melvin");
   b = new BankAccount(1000, "Bob");
   b.deposit("A thousand dollars");

17. What is printed in the following?

   String myString = "Yellow";
   String yourString = "Yellow";
   String hisString = new String("Yellow");
   String ourString = myString;
   System.out.println(myString = = yourString);
   System.out.println(myString = = ourString);
   System.out.println( myString.equals(yourString) );
   System.out.println( myString.equals(ourString) );
   System.out.println( myString = = hisString );
Project... Gas Mileage

Create a class called Automobile in which you pass a gas mileage (miles per gallon) parameter to the constructor which in turn passes it to the state variable, mpg. The constructor should also set the state variable gallons (gas in the tank) to 0. A method called fillUp adds gas to the tank. Another method, takeTrip, removes gas from the tank as the result of driving a specified number of miles. Finally, the method reportFuel returns how much gas is left in the car.

Test your Automobile class by creating a Tester class as follows:

```java
public class Tester {

    public static void main(String args[]) {

        //Create a new object called myBmw. Pass the constructor an argument of 24 miles per gallon
        Automobile myBmw = new Automobile(24);

        //Use the myBmw object to call the fillUp method. Pass it an argument of 20 gallons.
        myBmw.fillUp(20);

        //Use the myBmw object to call the takeTrip method. Pass it an argument of 100 miles. Driving 100 miles of course uses fuel and we would now find less fuel in the tank.
        myBmw.takeTrip(100);

        //Use the myBmw object to call the reportFuel method. It returns a double value of the amount of gas left in the tank and this is assigned to the variable fuel_left
        double fuel_left = myBmw.reportFuel();

        //Print the fuel_left variable
        System.out.println(fuel_left); //prints gallons left, 15.833333333333332
    }
}
```