

This work complies with the JMU Honor Code. I have neither given nor received unauthorized assistance, and I will not discuss the exam contents with anyone who has not taken it for credit.

Name: _____

Signature: _____

1. (18 points) One-Liners

- i. Rewrite `!(i > 0 && i < 10)` without using the `!` operator.

Expression: _____

- ii. Simplify `s1.isEmpty() == true || s1.equals(s2) == false`.

Expression: _____

- iii. Rewrite the following decision in one line of code.

```
if (credits >= 120 && gpa >= 2.0) {  
    return true;  
} else {  
    return false;  
}
```

Statement: _____

- iv. What is output by the following code fragment?

```
int i, n;  
n = 0;  
for (i = 0; i <= 5; n++) {  
    System.out.printf("%d", i);  
}
```

Output: _____

- v. Create a `Color` object that is 100% red, 50% green, and 0% blue.

Expression: _____

- vi. True when the string `s` comes after `t` alphabetically, false otherwise.

Expression: _____

2. (12 points) Vocabulary Matching

_____ call stack	A) One pass through (execution of) the body of a loop, including the evaluation of the condition.
_____ dead code	B) To iterate through the elements of a set and perform a similar operation on each one.
_____ iteration	C) Defining more than one method with the same name but different parameters.
_____ nesting	D) A way of evaluating conditional operators that only executes the second operand if necessary.
_____ overloading	E) Part of a program that can never be executed, often because it appears after a return statement.
_____ short circuit	F) Putting a conditional statement inside one or both branches of another conditional statement.
_____ signature	G) History of method calls and where to resume execution after each method returns.
_____ traverse	H) The first line of a method that defines its name, return type, and parameters.

3. (14 points) In each question below, `str` is the string "1234567890".

i. What does `str.charAt(10)` return?

v. What does `str.isEmpty()` return?

ii. What is the value of:
`str.indexOf('0', 10)`

vi. What is the value of:
`true || str.charAt(-1) == '0'`

iii. What does `str.substring(10)` return?

vii. What is the value of:
`str.charAt(3) > str.charAt(5)`
`&& str.substring(11).isEmpty()`

iv. What does `str.equals(str)` return?

4. (6 points) For each argument below, determine the return value.

```
public static String zap(String s) {  
    if (s.length() < 2) {  
        return s;  
    }  
    String sub = s.substring(2);  
    return s.charAt(0) + zap(sub);  
}
```

zap("") → _____

zap("Dukes!") → _____

zap("Madison") → _____

5. (10 points) The following method computes a mathematical sequence.

```
public static int seq(int n) {  
    int ans;  
    if (n == 1) {  
        ans = 3;  
    }  
    else if (n == 2) {  
        ans = 2;  
    }  
    else {  
        ans = seq(n - 2) + seq(n - 1);  
    }  
    return ans;  
}
```

What is the return value of each method call below?

seq(1) → ___ seq(2) → ___ seq(3) → ___ seq(4) → ___ seq(5) → ___

How many times is the seq method called to compute each result?

seq(1) : ___ seq(2) : ___ seq(3) : ___ seq(4) : ___ seq(5) : ___

7. (10 points) Complete the following method using a loop of some kind.

```
/**
 * Calculates the probability of tossing a coin
 * n times and getting n heads.
 *
 * The probability of getting a single head is 0.5.
 * The probability of getting two heads is 0.5 * 0.5.
 * The probability of n heads is 0.5 * 0.5 * ... * 0.5
 * (where there are n terms in the product).
 *
 * @param n number of tosses
 * @return probability of n heads in n tosses
 */
public static double probabilityOfHeads(int n) {

}
}
```

8. (10 points) Complete the following method using a loop of some kind.

```
/**
 * Counts the number of asterisks in a string.
 *
 * @param str the string
 * @return number of '*'
 */
public static int countStars(String str) {

}
}
```

Some additional array problems:

1. When there are no command-line arguments, what is the value of `(arg[0] == 0)`
2. Assume the following two declarations

```
int[] myArray = {1, 2, 3, 4, 5, 6}; int[] myArray2;
```

What is the value of each of the following?

- a) `myArray[2] == 2`
- b) `myArray[4]`
- c) `myArray != null`
- d) `myArray.length`
- e) `myArray2.length`
- f) `myArray2 == null`
- g) `myArray[2] + myArray[3] <= myArray[4]`
- h) What is the output of this code snippet:

```
myArray2 = myArray;  
myArray2[3] = 9;  
System.out.println(myArray[3]);
```

Make sure you know the following string methods.

```
str.equals()  
str.length()  
str.substring(x)  
str.substring(x, y)  
str.charAt(x)  
str.isEmpty()
```