

1. What is the value of `giveWarning` after the following code runs? (2 points)

```
boolean giveWarning = false;

int temp = 50;
int windSpeed = 75;
boolean isSunny = true;

giveWarning = (temp > 45) && (windSpeed > 25);

if (giveWarning && isSunny)
{
    giveWarning = false;
}
```

- a. true    b. false    c. Value cannot be determined from the preceding code.

2. Fill in the conditional statements for the code below. The names and data types of the variables you will need to use are provided. The following program determines the speed of a robot. The robot is equipped with a sensor that detects if there is anything in front of it. The robot also records the current battery percentage. Lastly, the robot also has an override button that the operator can press at any time. The robot's default speed is 15 provided that the sensor has not been tripped and the battery has at least 21% charge. If the sensors are not tripped, but the battery percentage is 20% or less, then the speed will be set to 5. If at any point, the operator presses their override, the robot speed should be 15. (4 points)

```
int moveSpeed;
int batteryPercent;
boolean operatorOverride;
boolean sensorsNotTripped;

if ( (sensorsNotTripped && batteryPercent >= 21) || operatorOverride ) {
    moveSpeed = 15;
}

else if ( sensorsNotTripped && batteryPercent <= 20 ) {
    moveSpeed = 5;
}

else {
    moveSpeed = 0;
}
```

3. The following are all true/false questions (6 points):

- i. You can have an `else` statement without an `if` statement.
- ii. An `else if` statement does not need a conditional statement.
- iii. The conditional in an `if` statement must evaluate to a boolean value.
- iv. You can have an `if` statement inside another `if` statement.
- v. The `||` operator is the "logical OR operator".
- vi. The ~~`**`~~ operator is the "logical AND operator".

88

`else if ( )`  
`{`  
`}`  
conditional statement (REQUIRED)

F  
F  
T  
T  
T  
F

nested if

```
if ( )  
{  
    if ( )  
    {  
    }  
}
```

4. Which operator negates (or flips) the value of a boolean expression? (2 points)

- a. `%`
- b. `|`
- c. `!`
- d. `&`

5. What does the switch structure do? (2 points)

- a. It turns the code on and off.
- b. It runs a piece of code over and over until a condition is met. → loop
- c. It is a variable that holds several pieces of data of the same data type within it. → array
- d. It is another type of conditional control structure where different options can be selected based on a variable's value.

6. What is the difference between a while loop and a do-while loop? (2 points)

- a. A while loop is always an infinite loop, and a do-while loop is not. → both can be infinite
- b. The order in which the conditional is evaluated.
- c. Do-while loops don't exist in Java.
- d. A do-while loop can do two things at the same time, and a while loop can't.  
↳ conditional is always executed separately from the body code, NOT simultaneously

7. What is the output of the following piece of code? (2 points)

```
for (int i = 5; i < 100; i = i * 2) {  
    if (i % 2 == 0) { // if i is divisible by 2  
        System.out.print(i + " "); // print i  
    }  
}
```

- a. 10 20 40 80
- b. nothing
- c. 10 20 40 80
- d. 10 20 40 80 100

5 is not divisible by 2 so it doesn't get printed

- 100 is outside of the bounds of the for loop  
- Also,  $80 * 2$  would be 160

8. Please write the output of the following code in the blank provided (4 points):

```
String msg = "";
int riskFactor = 0;
int heartRate = 124;
int patientAge = 19;
double hemoglobin = 13.5;
double patientTemp = 99.6;
boolean patientSmokes = true;
boolean patientHasCough = true;
boolean patientHasAsthma = true;
boolean patientHasStuffyNose = true;

if ((FpatientTemp > 100.4) || (TpatientHasCough && TpatientHasStuffyNose)) {
    ↪ System.out.println("The patient is sick.");

    if (124heartRate > 100) { = T
        ↪ riskFactor++; riskFactor = 1
    }
    if (19patientAge > 65) { = F
        riskFactor++;
    }
    if (13.5hemoglobin > 17.5 || 13.5hemoglobin < 12) { = F
        riskFactor++;
    }
    if (TpatientSmokes) { = T
        riskFactor++; riskFactor = 2
    }
    if (TpatientHasAsthma) { = T
        riskFactor++; riskFactor = 3
    }

    if (3riskFactor > 3) {
        System.out.println("The patient's condition should be monitored.");
    }
    ↪ else {
        System.out.println("Send the patient home.");
    }
}
else {
    System.out.println("The patient is not sick");
}
```

The patient is sick.

Send the patient home.

9. The next few questions will be based off the following section of code (8 points):

```
Scanner scnr = new Scanner(System.in);
int value = 0;
String input = "";

while (!input.equalsIgnoreCase("exit")) {
    System.out.println("Value is: " + value);
    System.out.println("What would you like to do next?");
    input = scnr.next();

    if (input.equalsIgnoreCase("increment")) {
        value++;
    }
    else if (input.equalsIgnoreCase("decrement")) {
        value--;
    }
    else if (input.equalsIgnoreCase("reset")) {
        value = 0;
    }
    else if (input.equalsIgnoreCase("exit")) { EXIT also works
        System.out.println("Goodbye!");
    }
    else {
        System.out.println("That was invalid input.");
    }
}
```

- i. What is the first thing the code prints out if the user first types 'decrement'?
- a. Value is: -1      c. Value is: 1  
b. Value is: 0      d. That was invalid input.
- ii. What is the first thing the code prints out if the user **then** types 'goodbye'?
- a. Value is: goodbye      c. Goodbye!  
b. Value is: 0      d. That was invalid input.
- iii. What is the first thing the code prints out if the user **then** types 'decrement'?
- a. Value is: -1      c. 0  
b. Value is: -2      d. That was invalid input.
- iv. What is the first thing the code prints out if the user **then** types 'EXIT'?
- a. Value is: exit      c. Goodbye!  
b. Value is: 0      d. That was invalid input.

10. Fill in the loop statement in the code below, so the output looks like the image below. (HINT: Pay attention to the fact that the numbers start counting at one and not zero.) (6 points)

CODE:

```
for ( int i=0; i<5; i++ ) {  
    for ( int j=1; j<=7; j++ ) { 5  
        // calculates the number of the day  
        int day = (j + (i * 7));  
  
        // adds an extra space if it is a single-digit  
        if (day < 10) {  
            System.out.print(day + " ");  
        }  
        // stops the code from printing any days after 31  
        else if (day <= 31) {  
            System.out.print(day + " ");  
        }  
    }  
    // goes on to the next line  
    System.out.println();  
}
```

OUTPUT:

7

1	2	3	4	5	6	7	\n
8	9	10	11	12	13	14	\n
15	16	17	18	19	20	21	\n
22	23	24	25	26	27	28	\n
29	30	31					

11. Why don't we use floating-point values (double and float) for loop control? (2 points)

- The compiler won't let you use floating-point values to control loops.
- Floating-point values can only hold integers, and we need decimals to control loops.
- ☒ Because some values cannot be accurately represented in binary, rounding issues can occur when we perform math operations with decimal numbers, leading to potentially unexpected output.
- Because floating-point values will continue to take up more and more memory as the loop runs, eventually resulting in a stack overflow error.

memory assigned to primitive types is constant and does not change size

12. Match the parts of the method header to the correct label. (Hint: two labels are used twice): (5 points)

public static void calcAvgTemp(double temp1, double temp2)

parameter data type      access modifier      return type      parameter name      method name

13. Which of the following is the most correct way to call the following method, assuming variables are defined as follows: (2 points)

MAIN METHOD:

```
int widthInches = 5;
int heightInches = 4;
int totalArea = 0;
```

METHOD:

```
public static int rectangleArea(int width, int height) {
    return width * height;
}
```

- a. totalArea = rectangleArea(widthInches, heightInches);
- b. rectangleArea(widthInches, heightInches); // technically correct but pointless as we don't save the result that is returned
- c. totalArea = rectangleArea();
- d. rectangleArea();

14. What is the output of the following piece of code? (3 points)

MAIN METHOD: System.out.println(isEmployee(1988, 2022));

METHOD:

```
public static boolean isEmployee(int startYear, int endYear) {
    boolean employed = false;
    if (startYear > 2024) {
        X System.out.print("The employee has not started yet. ");
    }
    else if (endYear <= 2024) {
        L if (endYear == 2022) {
            X System.out.print("The employee is retiring this year. ");
        }
        else {
            L System.out.print("The employee is retired. ");
        }
    }
    else {
        X System.out.println("The employee works here. ");
        employed = true;
    }
    return employed;
}
```

The employee is retired. false

BONUS (REQUIRED FOR HONORS STUDENTS): Write a method that calculates and returns the area of a triangle. This method should take in two parameters. The equation is:  $(\text{base} * \text{height}) / 2$ . (2 points)

```
public static double triArea(double base, double height)
{
    return (base * height) / 2.0;
}
```