1. A large office building has an elevator that carries occupants between any of the building's 10 floors. The basement is referred to as "Level 0" while the topmost floor is "Level 9." The software for the elevator uses a variable, called level, to track the floor number of the elevator's current position. When a person presses a button requesting the elevator to rise to a higher floor, the following is invoked:

```
REPEAT floors TIMES
 IF (level < 9)
  level ← level + 1
 ELSE
  DISPLAY "Cannot go up."
 DISPLAY "Level " + level
```

What is displayed if the elevator is currently on the 7th floor (level = 7) and the person on the elevator presses a button that says to go up 3 floors (floors = 3)? Explain or justify. (Multiple choice removed)

2. Below is a small segment of code that is suppose to switch the values of X and Y in a program.

```
Line 1: X ← 4
Line 2: Y ← 2
Line 3: X ← Y
Line 4: A ← Y
Line 5: Y ← X
Line 6: X ← A
Line 7: Y ← A
```

What two lines of code need to be removed in order for the code to function properly? Select two answers. Explain or justify. (Multiple choice removed)

3. What condition or conditions, if any, would make the following an infinite loop? Briefly justify or explain each correct answer. If there are no correct answers, explain or justify.

```
y ← 2
REPEAT UNTIL (CONDITION
 ( y ← y - 5
```

a. y = -108
b. y ≠ -3
c. y ≥ 8
d. y < -53
4. The following question uses a robot and a grid of squares. The robot is represented as a triangle, which is initially in the bottom left square of the grid and facing right.

Consider the following code segment, which moves the robot on the grid:

```
REPEAT 3 TIMES
  REPEAT n TIMES
    MOVE_FORWARD
    ROTATE_LEFT
    n = n - 1
```

Trace the robot’s path and its final resting place (including the direction it is facing). (Mult choice removed)

5. The block of code below is supposed to display “Multiple of 5” if the positive number value is in fact a multiple of 5.

```
IF (missing condition)
  DISPLAY "Multiple of 5"
ELSE
  DISPLAY "Incorrect"
```

Which of the following could be used in place of missing condition so the code will execute as intended? (There may be no correct answers, one correct answers, or multiple correct answers. Justify or explain each correct answer. If there are none, justify or explain.)

a.  
\[(value \ MOD \ 1) = 5\]

b.  
\[(value \ MOD \ 5) = 1\]

c.  
\[(value \ MOD \ 0) = 5\]

d.  
\[(value \ MOD \ 5) = 0\]
6. What starting value of \( n \) would make this portion of the program repeat the block of code below the most amount of times? **PROVE.**

\[
\begin{align*}
\text{REPEAT UNTIL } & n > 10 \\
\text{IF } & n \times 2 < 15 \\
& n \leftarrow n + 3 \\
\text{ELSE } & \\
& n \leftarrow n + 1
\end{align*}
\]

6a. 1
6b. 2
6c. 3
6d. 4

7. Below is a program that is supposed to be a “Guess a Number” game, wherein the user is trying to accurately guess a randomly generated number between 1 and 100.

Which two lines in the program, if any, need swapped in order for this program to work correctly? **If the program already works correctly, briefly explain or justify.**

7a. LINE 2
7b. LINE 3
7c. LINE 4
7d. LINE 5
8. Given a list of integers, sequence, and an integer, value, which of the following describes what the code segment does? (There may be no correct answers, one correct answers, or multiple correct answers. Justify or explain each correct answer. If there are none, justify or explain.)

```
i ← 1
FOR EACH item IN sequence
  IF (value > item)
    REMOVE sequence, i
  ELSE
    i ← i + 1
  END IF
END FOR
DISPLAY i
```

a. If sequence contains the integer value, it is removed.
b. The number of items in sequence that are greater than value is displayed.
c. Any items greater than value in sequence are removed.
d. Any items less than value in sequence are removed.

9. Based on the code below, what would be the appropriate phrase or phrases to replace missing output? Briefly explain or justify each correct answer. If there are no correct answers, explain or justify.

```
IF [LENGTH list] MOD 2 = 0
  DISPLAY missing output
ELSE
  DISPLAY missing output 2
END IF
```

a. You have an odd amount of items in your list!
b. You have an even amount of items in your list!
c. You have zero items in your list!
d. You have more than two items in your list!

10. Sort the following numbers, that are written in different bases, in numerical order from smallest to largest. Justify or explain.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>254</td>
<td>AE</td>
<td>10101101</td>
</tr>
<tr>
<td>10101101</td>
<td>AE</td>
<td>254</td>
</tr>
<tr>
<td>254</td>
<td>AE</td>
<td>10101101</td>
</tr>
<tr>
<td>254</td>
<td>AE</td>
<td>10101101</td>
</tr>
</tbody>
</table>

a. 254, 10101101, AE
b. 10101101, 254, AE
c. AE, 254, 10101101
d. 254, AE, 10101101