AP Computer Science Principles
# Session 1 – MCQ

1. Consider the code segment below.

```
Line 1: IF (a = 0)
Line 2: {
Line 3:     b ← a + 10
Line 4: }
Line 5: ELSE
Line 6: {
Line 7:     b ← a + 20
Line 8: }
```

Which of the following changes will NOT affect the results when the code segment is executed?

A. Change Line 3 to b ← 10

B. Change Line 3 to a ← b+10

C. Change Line 3 to b ← 20

D. Change Line 3 to a ← b+20

2. In the program below, *y* is a positive integer (e.g., 1, 2, 3, …).

```
result ← 0

REPEAT 3 TIMES

    REPEAT y TIMES

        result ← result + 1
```
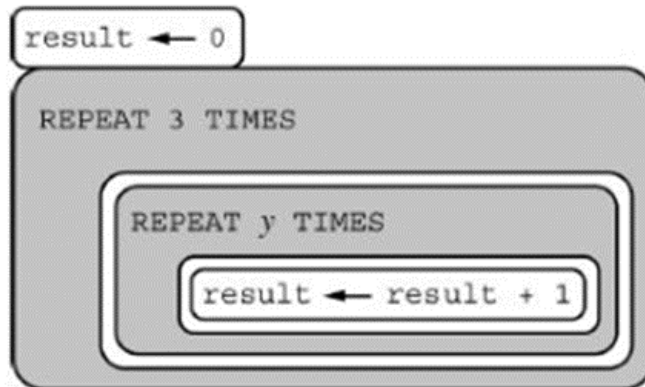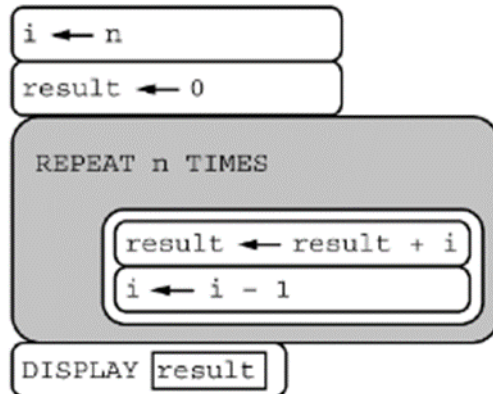
What is the value of result after running the program?

A. $y + 3$

B. $3y$

C. y^3

D. 3^y

3. Programs I and II below are each intended to calculate the sum of the integers from 1 to *n*. Assume that *n* is a positive integer (e.g., 1, 2, 3, …).

Program I:

```
i ← 1
result ← 0

REPEAT n TIMES

        result ← result + i
        i ← i + 1

DISPLAY result
```

Program II:

```
i ← n
result ← 0

REPEAT n TIMES

        result ← result + i
        i ← i - 1

DISPLAY result
```
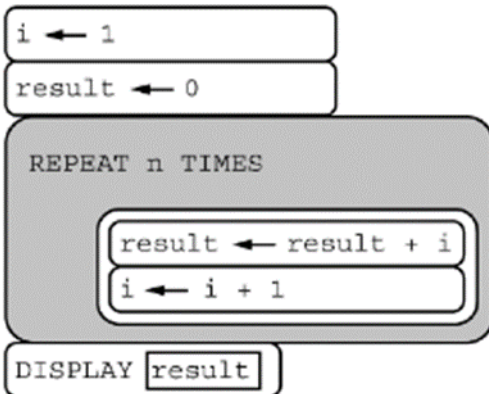
Which of the following best describes the behavior of the two programs?

    A. Program I displays the correct sum, but program II does not.
    B. Program II displays the correct sum, but program I does not.
    C. Both program I and program II display the correct sum.
    D. Neither program I nor program II displays the correct sum.

4. The question below uses a robot in a grid of squares. The robot is represented as a triangle, which is initially in the bottom-left square of the grid and facing toward the top of the grid.

   Code for the procedure *Mystery* is shown below. Assume that the parameter *p* has been assigned a positive integer value (e.g., 1, 2, 3, …).

```
PROCEDURE Mystery p

    REPEAT p TIMES

        MOVE_FORWARD
        MOVE_FORWARD
        ROTATE_RIGHT
```
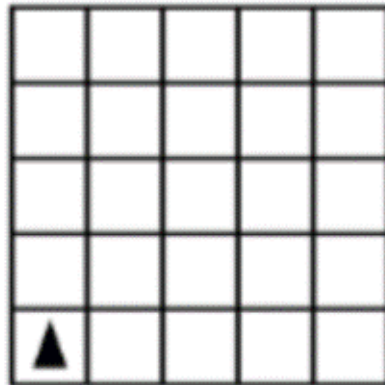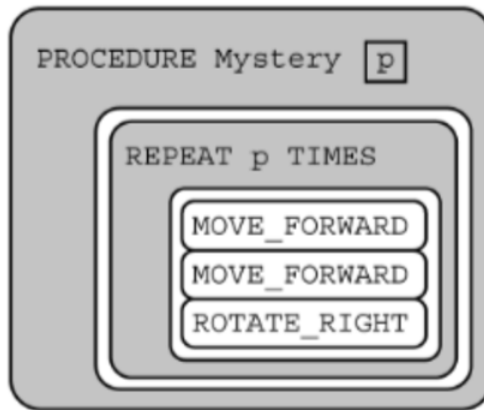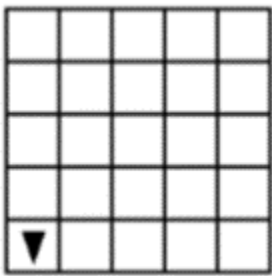
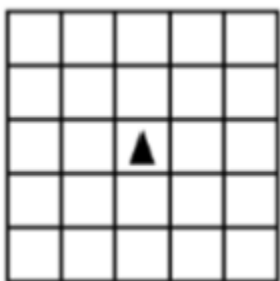Which of the following shows a possible result of calling the procedure?
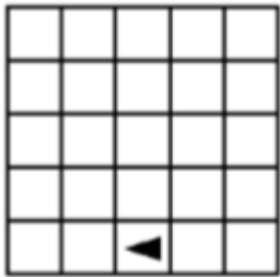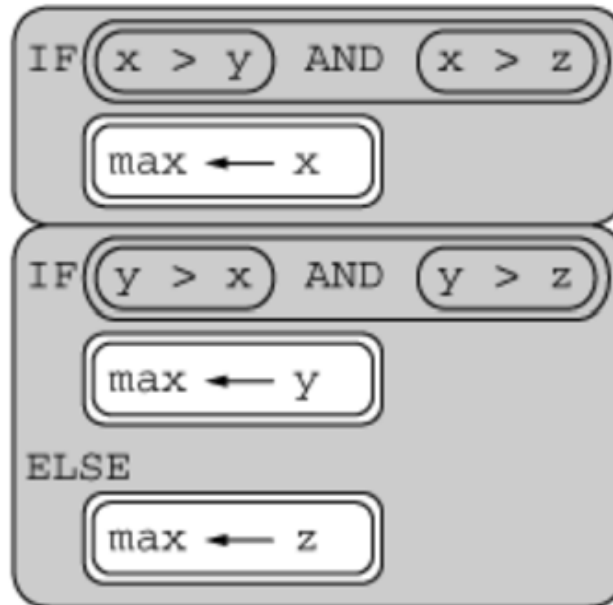
A. 
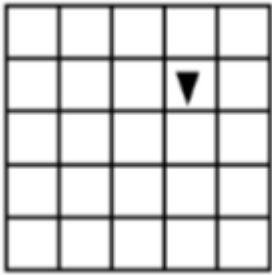
B. 

C. 

D.

5. The following code segment is intended to set `max` equal to the maximum value among the integer variables `x`, `y`, and `z`. The code segment does not work as intended in all cases.

```
IF (x > y) AND (x > z)
    max ← x

IF (y > x) AND (y > z)
    max ← y
ELSE
    max ← z
```

Which of the following initial values for `x`, `y`, and `z` can be used to show that the code segment does not work as intended?

A. x = 1, y = 2, z = 3
B. x = 1, y = 3, z = 2
C. x = 2, y = 3, z = 1
D. x = 3, y = 2, z = 1

6. In the procedure *Mystery* below, the parameter *number* is a positive integer.

```
PROCEDURE Mystery (number)
  {
      REPEAT UNTIL (number ≤ 0)
      {
            number ← number - 2
      }
      IF (number = 0)
      {
            RETURN (true)
      }
      ELSE
      {
            RETURN (false)
      }
  }
```

Which of the following best describes the result of running the procedure *Mystery*?

    A. The procedure returns *true* when the initial value of *number* is 2, and it otherwise returns *false*.

    B. The procedure returns *true* when the initial value of *number* is greater than 2, and it otherwise returns *false*.

    C. The procedure returns *true* when the initial value of *number* is even, and it otherwise returns *false*.

    D. The procedure returns *true* when the initial value of *number* is odd, and it otherwise returns *false*.

7. An algorithm will be used to identify the maximum value in a list of one or more integers. Consider the two versions of the algorithm below.

Algorithm I : Set the value of a variable *max* to -1. Iterate through the list of integer values. If a data value is greater than the value of the variable *max*, set *max* to the data value.

Algorithm II : Set the value of a variable *max* to the first data value. Iterate through the remaining values in the list of integers. If a data value is greater than the value of the variable *max*, set *max* to the data value.

Which of the following statements best describes the behavior of the two algorithms?

    A. Both algorithms work correctly on all input values.

    B. Algorithm I always works correctly, but Algorithm II only works correctly when the maximum value is not the first value in the list.

    C. Algorithm II always works correctly, but Algorithm I only works correctly when the maximum value is greater than or equal to -1.

    D. Neither algorithm will correctly identify the maximum value when the input contains both positive and negative input values.

8. A programmer is deciding between using a linear or binary search to find a target value in a sorted list. Which of the following is true?

    A. In all cases, a binary search of a sorted list requires fewer comparisons than a linear search.

    B. Generally, the advantage of using a binary search over a linear search increases as the size of the list increases.

    C. A linear search will generally run faster than a binary search because a linear search requires fewer lines of code to implement.

    D. Using a linear search is preferable to using a binary search if there is a chance that the target may not be found in the list.