AP Computer Science Principles
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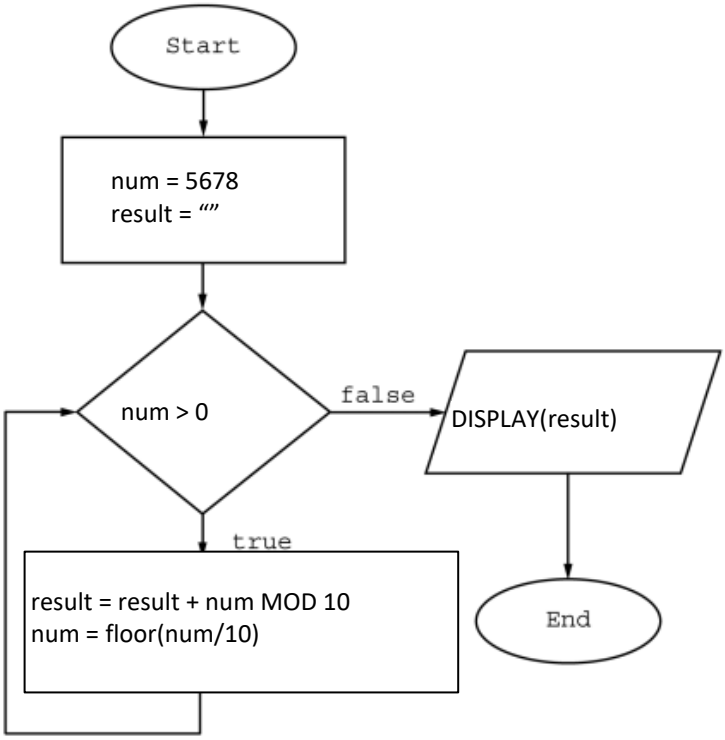
Set 29: While loops

Name _____ Period _____

Skill 29.01 Exercise 1

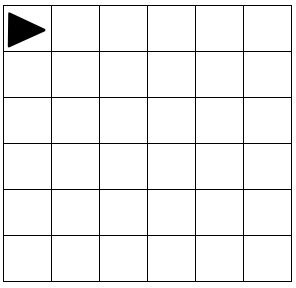
What is displayed as a result of executing the algorithm in the flowchart?



Skill 29.02 Exercise 1

```
row = 0;
col = 0;

WHILE(row <= 5){
    FILL(grey)
    row = row + 1
    col = col + 1
    MOVE_TO[row][col]
}
```



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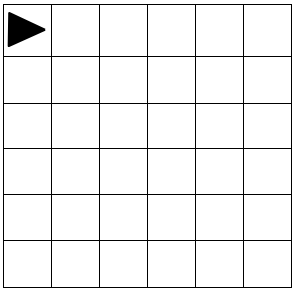
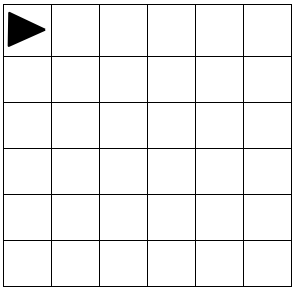
```
row = 0;
col = 0;

WHILE(row <= 5){
    if((row MOD 2)EQUALS(0)){
       FILL(grey)

    }
    row = row + 1
    col = col + 1
    MOVE_TO[row][col]
}
```



```
row = 0;
col = 0;

WHILE(col <= 5){
    if((row MOD 2)EQUALS(0)){
       FILL(grey)
    }
    col = col + 1
    MOVE_TO[row][col]
    if(col == 5){
        row = row + 1
        col = 0
    }
}
```



Skill 29.02 Exercise 2

In the procedure Mystery below, the parameter number is a positive integer. The procedure continues *while number* is less than or equal 0.

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

Indicate the output for each of the following calls.

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(a) Mystery(2)

(b) Mystery(3)

(c) Mystery(4)

Skill 29.02 Exercise 3

A program is created to perform arithmetic operations on positive and negative integers. The program contains the following incorrect procedure, which is intended to return the product of the integers x and y. The loop "REPEAT UNTIL (count = y)" continues while count is not equal to y.

```
PROCEDURE Multiply (x, y)
{
   count ← 0
   result ← 0
   REPEAT UNTIL (count = y)
   {
      result ← result + x
      count ← count + 1
   }
   RETURN (result)
}
```

A programmer suspects that an error in the program is caused by this procedure. Under which of the following conditions will the procedure NOT return the correct product?

Select two answers.

(A) When the values of x and y are both positive.

(B) When the value of x is positive and the value of y is negative.

(C) When the value of x is negative and the value of y is positive.

(D) When the values of x and y are both negative.

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Skill 29.02 Exercise 4

In a certain science experiment, 75 percent of trials are expected to be successful and 25 percent of trials are expected to be unsuccessful. The program below is inteded to simulate the result of repeated trials of the experiment. The loop "REPEAT 1000 TIMES" continues while TIMES is not equal to 1000.

```
successful ← 0
unsuccessful ← 0
REPEAT 1000 TIMES
{
   IF (<MISSING CODE>)
   {
      successful ← successful + 1
   }
   ELSE
   {
      unsuccessful ← unsuccessful + 1
   }
}
DISPLAY (successful)
DISPLAY ("trials were successful,")
DISPLAY (unsuccessful)
DISPLAY ("trials were unsuccessful.")
```

Which of the following can be used to replace <MISSING CODE> so that the simulation works as intended?

(A) RANDOM (1, 100) = 25

(B) RANDOM (1, 100) ≤ 25

(C) RANDOM (1, 100) = 75

(D) RANDOM (1, 100) ≤ 75

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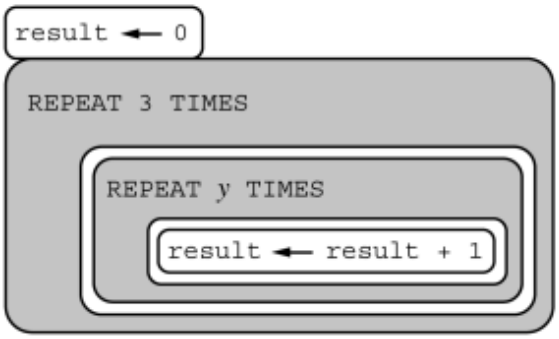
Skill 29.03 Exercise 1

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



What is the value of `result` after running the program?

(A) $y + 3$

(B) $3y$

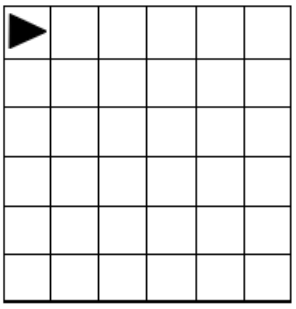
(C) y^3

(D) 3^y

Skill 29.03 Exercise 2

```
row = 0;
col = 0;

WHILE(row <= 5){
    WHILE(col <=5){
        MOVE_TO[row][col]
        if((col MOD 2)EQUALS(0)){
            FILL(grey)
        }
        col = col + 1
    }
col = 0
row = row + 2
}
```



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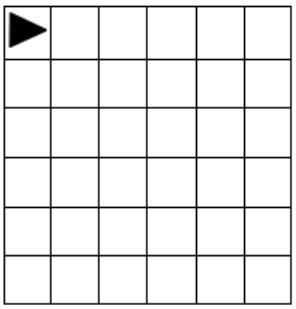
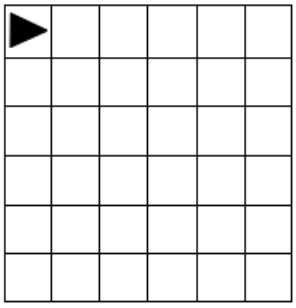
```
row = 0;
col = 0;

WHILE(row <= 5){
    WHILE(col <=row){
        MOVE_TO[row][col]
        FILL(grey)
        col = col + 1
    }
col = 0
row = row + 1
}
```



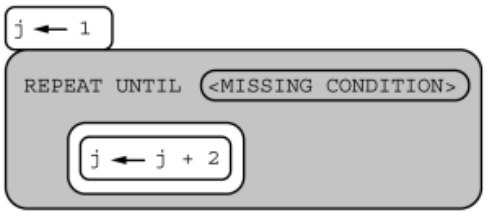
```
row = 5;
col = 0;

WHILE(row >= 0){
    WHILE(col <= row){
        MOVE_TO[row][col]
        FILL(grey)
        col = col + 1
    }
col = 0
row = row - 1
}
```



Skill 29.04 Exercise 1

Consider the following code segment.



Which of the following replacements for `<MISSING CONDITION>` will result in an infinite loop?

(A) `j = 6`

(B) `j ≥ 6`

(C) `j = 7`

(D) `j > 7`

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Skill 29.04 Exercise 1

The given code accidentally loops infinitely, so something must be wrong with the condition. Can you figure out how to fix it?

```
var die1 = -1;
while ( die1 != 2 || die1 != 3 ) {
  die1 = randomNumber(1, 6);
  write( "Rolled a " + die1 );
}
write("Done.");
```

Skill 29.05 Exercise 1

Write a function called *coinFlip* which simulates the flipping of a coin. *coinFlip* should accept a parameter which represents the number of flips, then return the number of heads that result.

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Skill 29.05 Exercise 2

Write a function called *reverseNum* that accepts a number as a parameter, then returns the reversed number. For example, the following call would return 98765

```
reverseNum(56789);
```