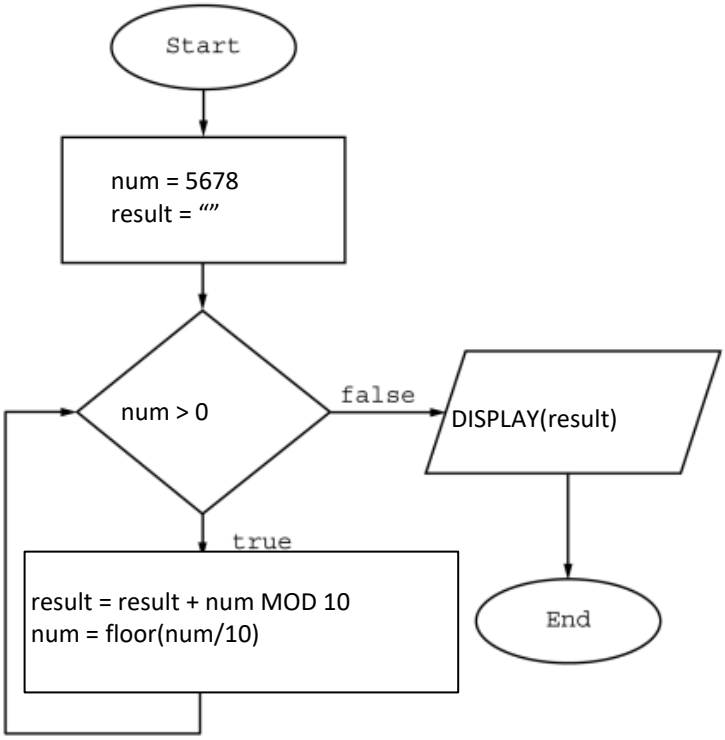
AP Computer Science Principles
Ticket Out the Door
Set 31: While loops

Name _____ Period _____

Skill 31.01 Exercise 1

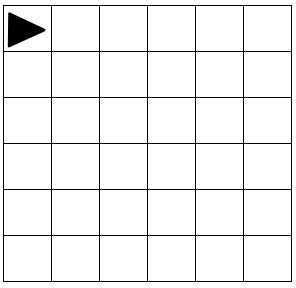
What is displayed as a result of executing the algorithm in the flowchart?



Skill 31.02 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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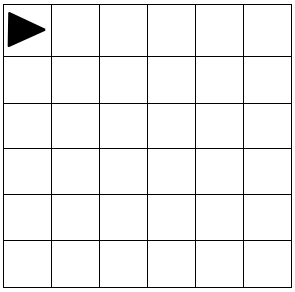
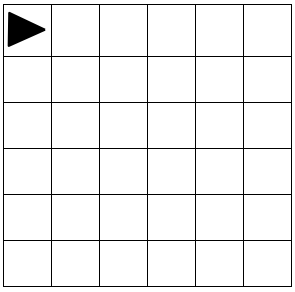
```
row = 0;
col = 0;

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 31.02 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 31.02 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 31.02 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 intended 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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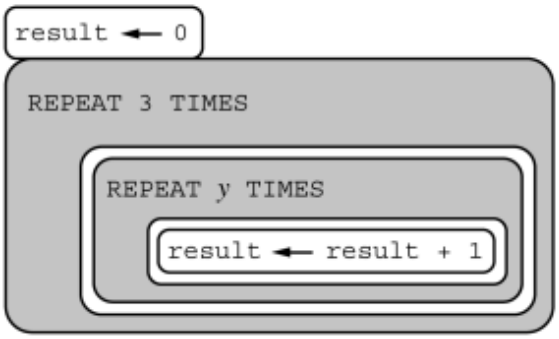
Skill 31.03 Exercise 1

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) $3y$

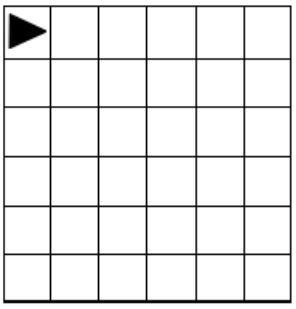
(C) y^3

(D) 3^y

Skill 31.03 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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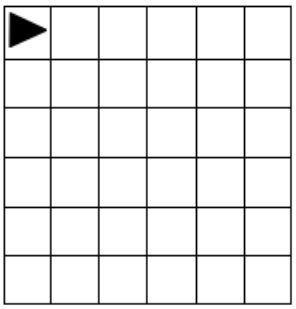
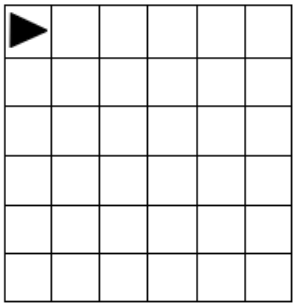
```
row = 0;
col = 0;

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



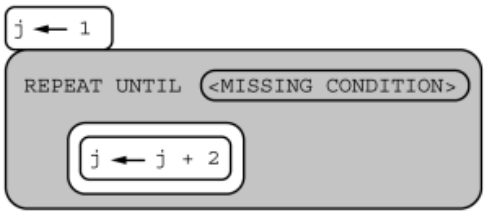
```
row = 5;
col = 0;

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



Skill 31.04 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 31.04 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 31.05 Exercise 1

Write a function called *countFlips* which simulates how many flips it takes to get a certain number of heads in a row. *countFlips* accepts a parameter called *streak*, which represents the number of heads in a row we need.

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Skill 31.05 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);
```