Fall 2021 AP CS A Lesson 4.1

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Do now

Be sure to…
1. **Get out your binder. Copy goal and date.**
2. **Look through your exam. Write down any initial questions you have.**

class: AP CS A **goal:** go over arrays unit test

MC question 1

1. What is the value of i after the code below has executed?

```
int[] x = {2, 1, 4, 5, 7};
int limit = 3;
int i = 0;
int sum = 0;
while ((sum < limit) && (i < x.length))
{
    i++;
    sum = sum + x[i];
}
```

A. 0
B. 1
C. 2
D. 3

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answer: C (2)

```
i  | sum
--------
0 | 0
1 | 0+1 = 1
2 | 1+4 = 5
sum !< limt -> halt
```

After the following code executes what are the values in `array2`?

```java
int[] array1 = {2, 4, 1, 3};
int[] array2 = {0, 0, 0, 0};
int a2 = 0;
for (int a1=1; a1 < array1.length; a1++)
{
  if (array1[a1] >= 2)
  {
    array2[a2] = array1[a1];
    a2++;
  }
}
```

A. {4, 3, 0, 0}
B. {4, 1, 3, 0}
C. {2, 4, 3, 0}
D. {2, 4, 1, 3}

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answer: C {2,4,3,0}

array1 = {2,4,1,3}
array2 = {0,0,0,0}

a1 = 0
a2 = 0
array2 = {2,0,0,0}
a2 = 1

a1 = 1
array2 = {2,4,0,0}
a2 = 2

a1 = 2
a1 = 3
array2 = {2,4,3,0}
a2 = 3
halt.

---

4. If any two numbers in an array of integers, not necessarily consecutive numbers in the array, are out of order (i.e. the number that occurs first in the array is larger than the number that occurs second), then that is called an inversion. For example, consider an array "x" that has the values {1, 4, 3, 2}. Then there are three inversions since 4 is greater than both 3 and 2 and 3 is greater than 2. Which of the following can be used to replace the missing code so that the code correctly counts the number of inversions?

```java
int inversionCount = 0;
for (int i=0 ; i < x.length - 1 ; i++)
{
  // missing code goes here
  {
    if (x[i] > x[j])
      inversionCount++;
  }
}
```

A. for (int j=0 ; j < x.length; j++)
B. for(int j=0 ; j < x.length - 1; j++)
C. for(int j=i+1; j < x.length; j++)
D. for (int j=i+1; j < x.length - 1; j++)

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C. You want to go through all remaining integers and check if they are greater than the current integer i.

5. Which of the following correctly copies all the even numbers from `array1` to `array2` at the same position as they are in `array1` without any errors? Assume that `array2` is large enough for all the copied values.

```
A.
int a2 = 0;
for (int a1=0 ; a1 < array1.length ; a1++)
{
    // if array1[a1] is even
    if (array1[a1] % 2 == 0)
    {
        // array1[a1] is even,
        // so copy it
        a2++;
        array2[a2] = array1[a1];
    }
}
B.
int a2 = 0;
for (int a1=0 ; a1 < array1.length ; a1++)
{
    // if array1[a1] is even
    if (array1[a1] % 2 == 0)
    {
        // array1[a1] is even,
        // so copy it
        array2[a2] = array1[a1];
        a2++;
    }
}
```

```
C.
int a2 = 0;
for ( int a1=0 ; a1 <= array1.length ; a1++)
{
    // if array1[a1] is even
    if (array1[a1] % 2 == 0)
    {
        // array1[a1] is even,
        // so copy it
        array2[a2] = array1[a1];
        a2++;
    }
}
D.
int a2 = 0;
for (int a1=0 ; a1 <= array1.length ; a1++)
{
    // if array1[a1] is even
    if (array1[a1] % 2 == 0)
    {
        // array1[a1] is even,
        // so copy it
        a2++;
        array2[a2] = array1[a1];
    }
}
```

array1 = {4,3,6}
array2 = {0,0,0}

a1=0
4 % 2 == 0
a2=0
array2 = {4,0,0}
a2 = 1

a1 = 1
3 % 2 != 0

a1=2
6%2 == 0
array2 = {4,2,0}

---

6. The greatest superhero movie of all time is...

    A. *The Incredibles* (2004)

    B. *Black Panther* (2018)

    C. *Spiderman: No Way Home* (2021)

    D. None of the above.

"Tombstone" is not a superhero movie.

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1. Describe Java arrays to a student who hasn't yet taken this unit. Be as detailed as possible and write in a complete paragraph below:

have yosuf explain his solution at board.

---

2. Use a for loop to write out the missing code necessary to reproduce the list below:

```
1. Saad
2. Yosuf
3. Sam
4. Rafiki
5. Luis
6. Maddox
```

```java
public static void main(String[] args) {
String[] roster = {Saad, Yosuf, Sam, Rafiki, Luis, Maddox}

//put for loop here
```

---

3. **Extra credit (+5 pts):** Finish the program below so that count_even() will return the sum of every other item in an array, beginning with the first item. If the method is correctly implemented, the program below should print the value 21:

```java
public static void main(String[] args){
    int[] arr1 = {3 ,5 ,7, 9, 11};
    int count = count_even(arr1);
    System.out.print("count = " + count);
}
public static int count_even(int[] arr){
    //complete this code
```

```java
int sum = 0;
for (int i = 0; i <arr.length; i+2){
sum+=arr[i];
}
return sum
```

Reflection: Thinking about thinking

be sure to: Answer each question below with a complete sentence. Be prepared to share out!

1. In what ways do you better understand arrays?
2. How does this change the way you approach MC and short response questions in the future?

1. Answers will vary, but students should have a better understanding of how the questions will be graded.
2. Students should pay less attention to certain details of Java syntax (brackets, parens, and so on) and more to the logical structure of their programs. This is why making a plan with pseudocode is helpful.