Beijing National Day School
Department of Mathematics & Computer Science

AP Computer Science A

Semester 2 Exam

Location: `Library, 6th Floor, Aspiration Building`
Date: `Wednesday, June 26th, 2019`
Start Time: `2:00PM`
End Time: `4:00PM`
NO CALCULATORS PERMITTED

English Name: _____

Pinyin Name: _____

Mr. Alwin Tareen, June 2019

Exam Record

Multiple Choice _____/ 30 pts

Short Answer _____/ 30 pts

Total: _____/ 60 pts

Grade: _____

Section I: Multiple Choice (30 points)

- Number of questions: 30. Percent of total grade: 50%.
- Decide which is the best of the choices given, and select the correct answer by placing an "**X**" in the corresponding box.

(1pt) **1.** Which of the following is NOT a primitive data type?

- ☐ `int`
- ☐ `double`
- ☐ `String`
- ☐ `boolean`

1 pt

(1pt) **2.** Which of the following arithmetic expressions produces a result of `3`?

- ☐ `(1 + 17) % 3`
- ☐ `1 + 17 % 3`
- ☐ `12 % 3 - 1`
- ☐ `5 * 2 % 3`

1 pt

(1pt) **3.** If the operator AND is used, which of the following will make the whole condition `true`?

- ☐ First operand `true`, second operand `false`
- ☐ First operand `false`, second operand `true`
- ☐ Both operands `true`
- ☐ Both operands `false`

1 pt

(1pt) **4.** The Boolean expression `!(E && F)` is logically equivalent to which of the following?

- ☐ `E || F`
- ☐ `!E || !F`
- ☐ `E && F`
- ☐ `!E && !F`

1 pt

(1pt) **5.** What is the output of the following code fragment?

```
for (int i = 3; i <= 12; i++)
{
    System.out.print(i + " ");
}
```

- ☐ `5 6 7 8 9`
- ☐ `4 5 6 7 8 9 10 11 12`
- ☐ `3 5 7 9 11`
- ☐ `3 4 5 6 7 8 9 10 11 12`

1 pt

5 pts

(1pt) **6.** What is the value of `pos` after the following code executes?

1 pt

```
String s1 = "ac ded ca";
int pos = s1.indexOf("d");
```

- ☐ 3
- ☐ 4
- ☐ 5
- ☐ -1

(1pt) **7.** How many times does the following code fragment print a `*`?

1 pt

```
for (int i = 3; i <= 9; i++)
{
    System.out.print("*");
}
```

- ☐ 9
- ☐ 7
- ☐ 6
- ☐ 10

(1pt) **8.** Given the following code fragment, what will be the contents of the array `arr` if the method `doubleLast()` is executed?

1 pt

```
public int[] arr = {-20, -15, 2, 8, 16, 33};
public void doubleLast()
{
    for (int i = arr.length/2; i < arr.length; i++)
    {
        arr[i] = arr[i] * 2;
    }
}
```

- ☐ `[-40, -30, 4, 16, 32, 66]`
- ☐ `[-40, -30, 4, 8, 16, 32]`
- ☐ `[-20, -15, 2, 16, 32, 66]`
- ☐ `[-20, -15, 2, 8, 16, 33]`

(1pt) **9.** Which of the following is a valid reason to use an ArrayList, instead of an array?

1 pt

- ☐ An ArrayList can grow or shrink as needed, while an array is always the same size.
- ☐ You can use a for-each loop on an ArrayList, but not on an array.
- ☐ You can store objects in an ArrayList, but not in an array.
- ☐ You can find the length of an ArrayList, but you can't find the length of an array.

4 pts

(1pt) **10.** How many recursive calls does the following method contain?

1 pt

```
public int fibonacci(int n)
{
    if (n == 0 || n == 1)
        return 1;
    else
        return fibonacci(n-1) + fibonacci(n-2);
}
```

- ☐ 0
- ☐ 1
- ☐ 2
- ☐ 3

(1pt) **11.** Which one of the following statements assigns the letter `S` to the third row and first column of a two-dimensional array named `strGrid`, assuming row-major order?

1 pt

- ☐ `strGrid[0][2] = "S"`
- ☐ `strGrid[1][3] = "S"`
- ☐ `strGrid[3][1] = "S"`
- ☐ `strGrid[2][0] = "S"`

(1pt) **12.** Which of the following statements would correctly retrieve the value `6` out of the array `arr`?

1 pt

```
int[][] arr = {{2, 4, 6, 8}, {1, 2, 3, 4}};
```

- ☐ `arr[0][3]`
- ☐ `arr[1][3]`
- ☐ `arr[0][2]`
- ☐ `arr[2][0]`

(1pt) **13.** What is a class?

1 pt

- ☐ A class is a data structure similar to an `ArrayList`.
- ☐ A class is a section of main memory which contains no data.
- ☐ A class is like a blueprint, which describes the state and behaviour of an object.
- ☐ A class is an array data structure that can only contain integers.

(1pt) **14.** Which of the following invokes the method `length()` of the object referenced by `str` and stores the result in `val`?

1 pt

- ☐ `val = str.length();`
- ☐ `val = length.str();`
- ☐ `val = length().str;`
- ☐ `val = length(str);`

5 pts

(1pt) **15.** What is the class of the type wrapper for the primitive type `int`?

- ☐ `myInt`
- ☐ `INT`
- ☐ `Integer`
- ☐ `Double`

1 pt

(1pt) **16.** How many choices are possible when using a single `if-else` statement?

- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4

1 pt

(1pt) **17.** A colony of rabbits doubles its population every 28 days. The population starts out at 2, and increases until it reaches 100000. Say that a section of code simulates this process. Which of the following `while` statements is most likely to be used?

- ☐ `while (population = 100000)`
- ☐ `while (population < 100000)`
- ☐ `while (population > 28)`
- ☐ `while (population = 28)`

1 pt

(1pt) **18.** When you run a Java application by typing `java SomeClass` what is the first method that starts?

- ☐ The `main()` method of `SomeClass`.
- ☐ The `run()` method of `SomeClass`.
- ☐ The `someClass` method.
- ☐ The applet method.

1 pt

(1pt) **19.** What value is assigned to a reference variable to show that there is no object?

- ☐ `0`
- ☐ `void`
- ☐ `null`
- ☐ `nada`

1 pt

(1pt) **20.** When an object no longer has any reference variables referring to it, what happens to it?

- ☐ It sits around in main memory forever.
- ☐ It is swapped out to the hard disk drive.
- ☐ The garbage collector makes the memory it occupies available for new objects.
- ☐ It gets emailed to the Oracle corporation, who then disposes of it.

1 pt

6 pts

(1pt) **21.** What is the output of the following code fragment?

1 pt

```
String str = "Hello World!";
System.out.println(str.length());
```

- ☐ 0
- ☐ 10
- ☐ 11
- ☐ 12

(1pt) **22.** What is the output of the following code fragment?

1 pt

```
for (int i = 0; i < 5; i++)
{
    System.out.print(i + " ");
}
```

- ☐ `1 2 3 4 5`
- ☐ `0 1 2 3 4`
- ☐ `0 1 2 3 4 5`
- ☐ `i i i i i`

(1pt) **23.** What is the output of the following code fragment?

1 pt

```
int[] arr = {2, 4, 6, 8};
System.out.println(arr[0] + " " + arr[1]);
```

- ☐ `2 6`
- ☐ `8`
- ☐ `2 4`
- ☐ `6 8`

(1pt) **24.** What is the output of the following code fragment?

1 pt

```
int[] arr = {2, 4, 6, 8, 10, 1, 3, 5, 7, 9};
for (int i = 0; i < 5; i++)
{
    System.out.println(arr[i] + " ");
}
```

- ☐ `2 4 6 8`
- ☐ `2 4 6 8 10`
- ☐ `2 4 6 8 10 1`
- ☐ `2 4 6 8 10 1 3 5 7 9`

4 pts

(1pt) **25.** Given the following array declaration, what is `values[2][1]`?

1 pt

```
double[][] values = { {1.2, 9.0, 3.2},
                      {9.2, 0.5, 1.5},
                      {7.3, 7.9, 4.8} };
```

- ☐ `7.3`
- ☐ `7.9`
- ☐ `9.2`
- ☐ There is no such array element.

(1pt) **26.** What is the name of the superclass that every other class in Java inherits from?

1 pt

- ☐ `Object`
- ☐ `Base`
- ☐ `Root`
- ☐ `Foundation`

(1pt) **27.** Which of the following is the correct way to declare an `ArrayList` with data type `Integer`?

1 pt

- ☐ `ArrayList<String> list = new ArrayList<String>();`
- ☐ `ArrayList<int> list = new ArrayList<int>();`
- ☐ `ArrayList list = new ArrayList();`
- ☐ `ArrayList<Integer> list = new ArrayList<Integer>();`

(1pt) **28.** Which of the following choices is the correct way to set up a constructor?

1 pt

- ☐ `public String Rectangle()`
- ☐ `public static int SportsTeam(int players)`
- ☐ `public constructor Bicycle(int gears)`
- ☐ `public Compass(int direction)`

(1pt) **29.** Consider a class that has two constructors. Which of the following conditions must be true in order for the program to compile correctly?

1 pt

- ☐ The constructors must be declared private and void.
- ☐ The constructors must be placed in separate source code files.
- ☐ The constructors must specify a return type.
- ☐ The constructors must have unique parameter lists.

(1pt) **30.** Which of the following choices would be considered an accessor method?

1 pt

- ☐ `public Kennel(double price)`
- ☐ `public String getName()`
- ☐ `public Ticket()`
- ☐ `public class Player`

6 pts

Part II: Short Answer (30 points)

- Number of questions: 30. Percent of total grade: 50%.
- Answer each of the following questions in the space provided.

(1pt) **1.** Which of `Java`'s primitive data types would you use to store the square root of 2?

1 pt

(1pt) **2.** Which of `Java`'s primitive data types would you use to store your age?

1 pt

(1pt) **3.** Write a single line of code that will create an integer variable called `num` and store the number 407 in it.

1 pt

(1pt) **4.** Write a single line of code that will create a `String` variable called `name` and store your name in it.

1 pt

(1pt) **5.** If `String buddy = "groovy dude";` then what is the output of:
`System.out.println(buddy.toUpperCase());`

1 pt

(1pt) **6.** Which character is at the 5th index in the String `"Herman Munster"`?

1 pt

(1pt) **7.** When comparing two Strings for equality, the double equals operator(`==`) should not be used. What is the name of the method that *should* be used?

1 pt

7 pts

(1pt) **8.** Write a single line of code that will increment the integer variable `num` by 1.

1 pt

(1pt) **9.** What are the two possible values of a `boolean` variable?

1 pt

(1pt) **10.** What is the `Java` operator for the boolean **AND** operation?

1 pt

(1pt) **11.** What is the `Java` operator for the boolean **OR** operation?

1 pt

(1pt) **12.** What is the output of: `System.out.println(true && true || false);`

1 pt

(1pt) **13.** Write a statement that will store the value `true` in a `boolean` variable `throttle` if the value in the variable `height` is 44 or less.

1 pt

(1pt) **14.** Write code using a `for-loop` that will print out the numbers `3, 6, 9, 12, 15`.

1 pt

(1pt) **15.** Given the following line of code, identify the class, and identify the object:
`Rectangle board = new Rectangle(length, width);`

1 pt

8 pts

(1pt) **16.** Instantiate an object called `fido` from the `Puppy` class using a single line of code. Assume that no parameters are sent to the constructor.

1 pt

(1pt) **17.** Write a single line of code that will create an array of type `double` called `scores` having 800 elements.

1 pt

(1pt) **18.** Given the array: `double[] digits = new double[21]`
What is the output of: `System.out.println(digits.length);`

1 pt

(1pt) **19.** Assume that the integer array `data` contains the five values: 34, 56, -102, 18 and 5. What is the value of `data[1]`?

1 pt

(1pt) **20.** Write a single line of code that will instantiate an `ArrayList` object called `places` and have the restriction that only `String` objects can be stored in it.

1 pt

(1pt) **21.** A class from which you cannot create objects is called what kind of class?

1 pt

(1pt) **22.** Is it possible to have multiple constructors in the same class?

1 pt

(1pt) **23.** Is it true that inheritance models the "is-a" relationship, where objects of the subclass are also objects of the superclass? Answer **yes** or **no**.

1 pt

8 pts

(1pt) **24.** What must be required of an array of numbers before a binary search can be done?

1 pt

(1pt) **25.** Which is generally more efficient, a linear search or a binary search, if the array is already sorted?

1 pt

(1pt) **26.** If we were given a sufficiently large amount of memory space, which of the following sorting algorithms would be more efficient: selection sort, insertion sort, or merge sort?

1 pt

(1pt) **27.** Consider the following array: `int[] temps = {34, 56, -102, 18, 5}`
What is the output of: `System.out.println(temps[3] + temps[4])`?

1 pt

(1pt) **28.** Consider the following array: `String[] names = {"Bob", "Jim", "Sally"}`
Write a single line of Java code that will display the element `"Sally"` from this array.

1 pt

(1pt) **29.** Consider the following array: `int[] nums = new int[7];`
Write a section of Java code that would place the number `23` into every position in the array. *Hint:* Use a `for` loop.

1 pt

(1pt) **30.** Merge sort uses the "divide-and-conquer" approach in its algorithm. In this context, explain what "divide-and-conquer" means.

1 pt

7 pts

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0 pts