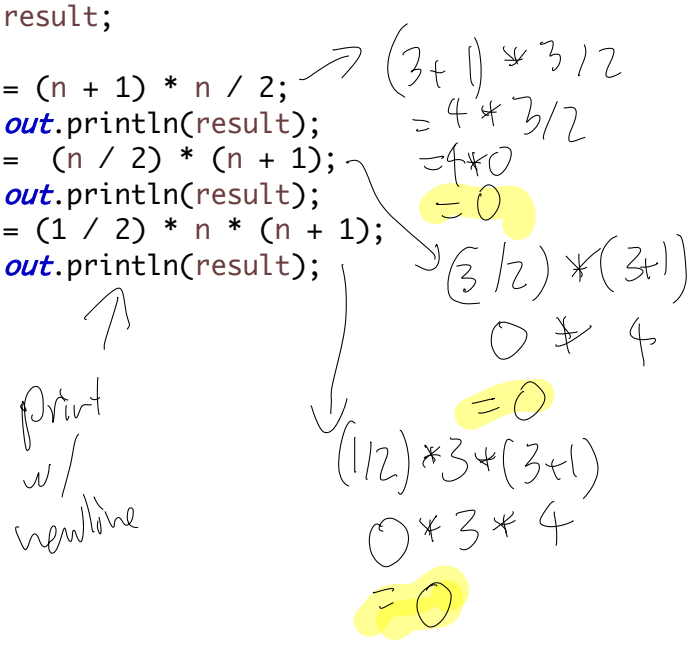
AP Computer Science Practice Problems

1. What is printed for each of the print statements below? Draw the console output in the correct format with the correct values. **[4 points]**

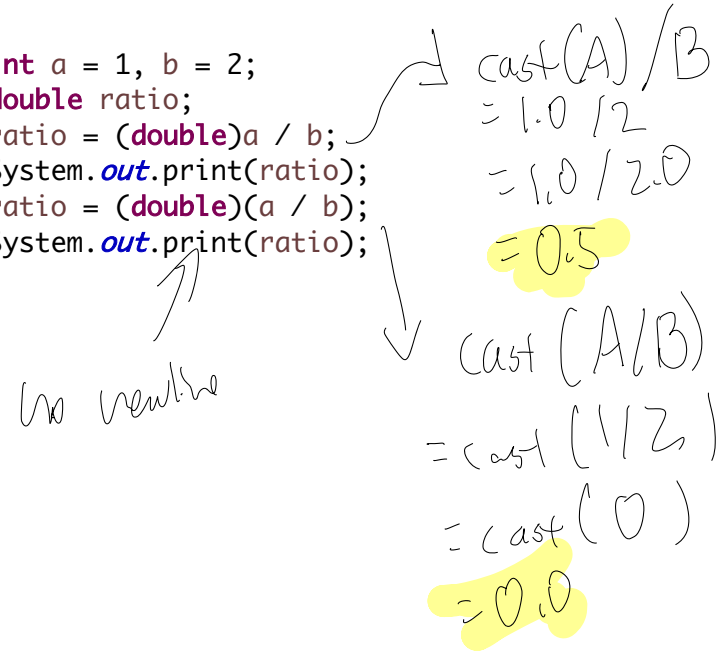
```
int n = 3;
double result;

result = (n + 1) * n / 2;
System.out.println(result);
result =  (n / 2) * (n + 1);
System.out.println(result);
result = (1 / 2) * n * (n + 1);
System.out.println(result);
```



2. Draw the console output for the code below in the correct format with the correct values. **[2 points]**

```
int a = 1, b = 2;
double ratio;
ratio = (double)a / b;
System.out.print(ratio);
ratio = (double)(a / b);
System.out.print(ratio);
```



3. Which of the following expressions does ***NOT*** evaluate ***x*** to 0.4? **[1 point]**

```
A. double x = (int) 4.5 / (double) 10;
B. double x = (double) (4 / 10);
C. double x = 4.0 / 10;
D. double x = 4 / 10.0;
E. double x = (double) 4 / (double) 10;
```

4. What is printed below? Draw the correct console output in the correct format with the correct values. **[3 points]**

```
int r = 0;
r = 17 % 3;
System.out.print(r);
r = 8 % 2;
System.out.print(r);
r = 4 % 5;
System.out.print(r);
```

5. What is the result when the code segment is compiled and executed? **[1 point]**

```
int m = 4, n = 5;
double d = Math.sqrt((m + n) / 2);
System.out.println(d);
```

```
A. Syntax error "Math.sqrt(double) cannot apply to int"
B. 1.5 is displayed
C. 2.0 is displayed
D. 2.1213203435596424 is displayed
E. ClassCastException
```

6. Given the declarations and code below which of the following expressions will evaluate to 7.5? **[1 point]**

```
int p = 5, q = 3;

A. (double) p *  (double)q / 2;
B. (double) p * (double)(q / 2);
C. (double) (p * q / 2);
```

A. I only
B. II only
C. I and II
D. I, II , and III
E. None of the above

7. Assuming that ***c*** and ***d*** are Boolean variables,

```
boolean c  = <some value>;
boolean d = <some value>;
```

the expression `!c || d` is equivalent to **[1 point]**

A. `!(c && d)`
B. `!(c && !d)`
C. `c && !d`
D. `!(c || !d)`
E. `!( !c && d)`

8. Suppose ***a***, ***b***, and ***c*** are positive integers under 1000 and ***x*** satisfies the formula after the declarations

```
int a, b, c, d;

a / b = c / x;
```

The integer value ***d*** is obtained by truncating ***x*** to an integer. Which of the following code segments correctly calculates d? **[1 point]**

A.
```
d = c * b / a;
```
B.
```
int temp = c * b;
    d = temp / a;
```
C.
```
(int) temp  = b / a;
    d = c * temp;
```

A. I only
B. II only
C. I and II
D. II and III
E. I, II , and III

9. Suppose the class **Particle** has the variables defined: **[1 point]**

```
public class Particle
{
    public static final int START_POS = 100;
    private double velocity;

    /*other code not shown*/
}
```

Which of the following inside the Particle class is true?

A. velocity can be passed as an argument to a method, but *START_POS* cannot.
B. Java syntax rules wouldn't allow us to use the name startPos instead of *START_POS*.
C. Statement double pos = *START_POS* + velocity is a syntax error.
D. Java syntax rules wouldn't allow us to make velocity public.
E. Statement double *START_POS* += velocity is a syntax error.

10. What is the output from the following code segment? **[1 point]**

```
double pi = 3.14159;
int r = 100;
int area = (int)(pi * Math.pow(r, 2));
System.out.println(area);
```

A. 30000
B. 31415
C. 31416
D. 314159
E. It depends on the particular computer system.

11. What is the output from **[1 point]**

```
int n = 12;
System.out.print(goFigure(n));
System.out.print(" " + n);

public static double goFigure(int n)
{
    n = n % 7;
    return (double)(12 / n);
}
```

A. 2.4 12
B. 2.4 6
C. 2.4 5
D. 2.0 12
E. 2.0 5

12. What is the size of a `double` variable in Java? **[1 point]**

A. 2 bytes
B. 4 bytes
C. 8 bytes
D. It depends on the compiler settings.
E. It depends on the operating system.

13. What does the print statement below display? **[1 point]**

```
System.out.println("1" + new Integer(2) + 3);
```

A. The statement has a syntax error and won't compile.
B. 6
C. 15
D. 123
E. ClassCastException

14. Given **[1 point]**

```
double x = 5, y = 2;
```

What is the value of ***m*** after the following statement is executed?

```
int m = (int)(x + y + x / y - x * y - x / (10 * y));
```

A. -1
B. -0.75
C. -0.5
D. 0
E. 1

15. What is the output from the following code? **[1 point]**

```
int a = 1, b = 2, c = 3;
a += b + c;
b += a + c;
c += a + b;
System.out.println(a + " " + b + " " + c);
```

A. 3 3 4
B. 3 5 6
C. 5 4 3
D. 5 8 13
E. 6 11 20

16. What is the size of an `int` variable in Java? **[1 point]**

A. 2 bytes
B. 4 bytes
C. 8 bytes
D. It depends on the compiler settings.
E. It depends on the operating system.

17. The method **`xProperty`** is defined as follows: **[1 point]**

```
public boolean xProperty(int a)
{
      return a == 2 * (a / 10 + a % 10);
}
```

For which of the following values of `a` does `xProperty` return `true`?

A. 2
B. 4
C. 18
D. 28
E. 128

18. Which of the following does ***NOT*** display 2/3? **[1 point]**

```
A. System.out.println("2/3");
B. System.out.println("2" + "/" + "3");
C. System.out.println(2/3);
D. System.out.println(2 + "/" + 3);
E. System.out.println((int)2 + "/" + (int)3);
```

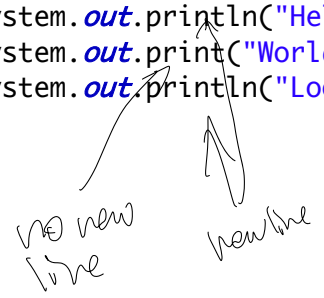
int division

19. What is the size of a `Boolean` variable in Java? **[1 point]**

A. 1 bit
B. 2 bits
C. 2 bytes
D. 4 bytes
E. 8 bytes

20. Draw the console output from the following code. **[3 points]**

```
System.out.println("Hello");
System.out.print("World");
System.out.println("Look at me!");
```



Hello (newline)
WorldLook at me!

21. Consider the following method: **[1 point]**

```
public static int compute(int val)
{
        val += val;
        val += val;
        return val;
}
```

Which statement could replace the body of compute so that the same result is returned?

A. `return (int)Math.pow(val, 4);`
B. `return (int)Math.pow(val, 3);`
C. `return 2 * Math.pow(val, 2);`
D. `return val * 4;`
E. None of the above

22. The method below is part of a class called **Computer**. Which is the correct way to invoke the method compute **outside** of the class **Computer**? **[1 point]**

```
public static int compute(int val)
{
        val += val;
        val += val;
        return val;
}
```

A. `Math.compute(3);`
B. `Computer c = new Computer();  c.compute(3);`
C. `Computer.compute(3);`
D. `Computer.compute(3.0);`
E. `Computer.compute("3");`

23. What is returned from a call to the method below if the value passed to the method is 5? **[1 point]**

```
public static int compute(int val)
{
        val += val;
        val += val;
        return val;
}
```

A. 125
B. 25
C. 20
D. 100
E. 625

24. Consider the following code: **[1 point]**

```
public static final int START = 100;
```

Which of the following is not legal code?

```
A. int max = START + 200;
B. int min = START - 100;
C. System.out.println("Start Squared = " + Math.pow(START, 2));
D. value += 5 + START; //assume value was created an initialized
E. START += START + 20;
```

25. Suppose that the partial Desk class is written as follows: **[1 point]**

```
public class Desk
{
      private String typeOfMaterial;

      public Desk(String type)
      { /*implementation not shown*/}

}
```

Which code is the correct code to instantiate a Desk object?

```
 I.  Desk desk = new Desk();

 II.  Desk desk = new Desk("wood");

III.  Desk desk = Desk.wood;
```

```
A. I only
B. II only
C. I and II only
D. I, II , and III
E. II and III only
```

26. Which method below is the correct accessor (getter) method implementation that can be placed in the Desk class? **[2 points]**

A. `private String getTypeOfMaterial(){ return typeOfMaterial;}`
B. `private Desk getTypeOfMaterial(){ return typeOfMaterial;}`
C. `public Desk getTypeOfMaterial(){ return typeOfMaterial;}`
D. `public String getTypeOfMaterial(String t){ typeOfMaterial=t;}`
E. `public String getTypeOfMaterial(){ return typeOfMaterial;}`

27. The Desk class is used to construct a desk. Write the code that will construct a desk made of wood and write the setter for `typeOfMaterial`. **[2 points]**

```
public class Desk
{
      private String typeOfMaterial;
      public Desk(String type)
      { /*implementation not shown*/}
}
```

28. Suppose you were tasked with computing the minimum of three integer scores: a, b, c. Which method call performs this calculation? **[1 point]**

I. `Math.min(Math.min(a, b), c);`

II. `Math.min(a, b, c);`

III. `Math.min((a, b), c);`

A. I only
B. II only
C. I and II
D. I and III
E. I, II , and III

29. Consider the incomplete class definition and the code that is written in a client program: **[1 point]**

```
public class Mail{ … }
Mail mail = new Mail();
```

Which statement is **NOT** correct?

A. mail is an object.
B. Mail is the blueprint for mail.
C. mail is an instance of Mail.
D. A Mail is an instance of mail.
E. Mail is a class.

30. Which is the line of code that will print 64.0? **[1 point]**

A. System.out.println(Math.pow(2,4));
B. System.out.println(Math.sqrt(64));
C. System.out.println(Math.pow(4,3));
D. System.out.println(Math.sqrt(8));
E. System.out.println(Math.pow(3, 2));

31. What is the output from **[1 point]**

```
double n = 12;
System.out.print(n);
n = goFigure(n);
System.out.print(" " + n);

public static double goFigure(double n)
{
      n = (int)n % 7;
      return 12 / n;
}
```

A. 12 2.0
B. 12.0 2.0
C. 12 2.4
D. 12.0 2.4
E. 12.0 5.0

32. The math class has a method called random. It generates a random number on the interval [0, 1). There is also a Random object that can produce a random set of integers. This random object is created using its default constructor.

    a. What random integer interval will the following code produce? **[2 points]**

    ```
    (int)(Math.random() * 5) + 10;
    ```

    b. What random integer interval will the following code produce? **[2 points]**

    ```
    Random rand = new Random();
    rand.nextInt(13) – 6 ;
    ```

33. What is the output from the following code? **[1 point]**

```
int a = 1, b = 2, c = 3;
a += b + c;
b += a + c;
c += a + b;
System.out.println(a + " " + b + " " + c);
```

A. 3 3 4
B. 3 5 6
C. 5 4 3
D. 5 8 13
E. 6 11 20

34. Which of the following statement is correct? **[1 point]**

public class Square **extends** Rectangle {}

public class Rectangle **extends** Quadrilateral{}

public class Quadrilateral{}

I. A Rectangle is an Object
II. Square is a subclass of Rectangle
III. Quadrilateral is the super class of Rectangle

A. I & II Only
B. II & III Only
C. II Only
D. I & III Only
E. I, II, & III

35. The Pencil class below has two constructors. Which of the following are valid instantiation of an object from the Pencil class? **[1 point]**

public class Pencil {

//attributes not shown

Pencil(String type, **boolean** hasEraser) { //implementation not shown}

Pencil(String type, **boolean** hasEraser, **int** number) { //implementation not shown}

//methods not shown }

I. `new Pencil("Mechanical", true, 7/3);`
II. `String type = "Regular";`

`new Pencil(type, false, 1);`

III. `new Pencil("Regular", true);`

A. I only
B. II only
C. I and II
D. II and III
E. I, II , and III

36. Assuming that ***c*** and ***d*** are Boolean variables, **[1 point]**

```
boolean c = <some value>;

boolean d = <some value>;
```

the expression `!c || d` is equivalent to

A. `!(c && d)`
B. `!(c && !d)`
C. `c && !d`
D. `!(c || !d)`
E. `!(!c && d)`

37. Which of the following statement is correct? **[1 point]**

A. All attributes are methods.
B. All classes must have a non-default constructor.
C. All instance variables are private.
D. All methods must return a value.
E. All final variables are constants.

38. Which one stands for API? **[1 point]**

A. Application Portable Information
B. Application Portable Invariant
C. Abstract Portable Information
D. Abstract Programming Interface
E. Application Programming Interface

39. The String class has a method called **contains**. It returns true if a String contains another String. For example, `"candy".contains("a")` returns true and `"candy".contains("e")` returns false. The method below should use contains to count the number of **different** vowels that are in a String. For example, the String `"candy"` should return 1 because there is an `"a"`. However, the String `"beautiful"` should return 4 because it contains four **different** vowels `"eaui"`. The maximum number this method can return is 5 because there are exactly five vowels `"aeiou"`. If the String does not contain a vowel, -1 is returned. For example, the String `"gym"` will return -1 because y is not a vowel. **[6 points]**

```
//Precondition: s is not null & contains only lowercased letters
//Postcondition: returns vowel count, otherwise returns -1
public int countDifferentVowelsInString(String s)
{









}
```

40. The class Palindrome has one constructor and two methods. One of the methods is called **reverseString** that returns a String with the characters in reversed order. The implementation of **reverseString** is not shown but it works as intended. Write the constructor and method called **isPalindrome** that takes in one String and returns a boolean. The method's job is to determine if the word is a palindrome. A palindrome is a String that spells the same word forwards and backwards. For example, `"dad"`, `"mom"`, `"racecar"`, `"pop"` are all palindromes. The String class has a method called **equals** that returns true if two words have the same characters in the same order. For example, `"mom".equals("mom")` returns true and `"candy".equals("ydnac")` returns false. **[6 points]**

```
public class Palindrome()
{
      private String word;

      //Precondition: s in NOT null
      //Postcondition: returns s with characters reversed
      private String reverseString(String s)
      {/*Implementation not shown*/}

      //Complete the constructor          [2 points]
     public Palindrome(String word)
     {


     }

      //Complete the method               [4 points]
      //Precondition: s in NOT null
      //Postcondition: return true if word is a palindrome
      //else returns false otherwise
      public boolean isPalindrome()
      {









      }
}//end class Palindrome
```