Problem (1) [10 points] Write a single if-statement that is true for all the values of i shown and false on values not shown. The "..." represents that the pattern of numbers continues in the direction indicated.

(Example) int i: ... -2, -1, 0
Answer: if(i <= 0)

(a) int i: 0, 1, 2, 3, 4, 5
(b) int i: ... -2, -1, 0, 5, 6 7, 8, ...
(c) int i: ... -2, 0, 2, 4, 6, 8, ...
(d) int i: 0, 2, 4, 6, 8
(e) int i: ... -4, -2, 2, 4, 6, 8, ...
Problem (2) [10 points] Suppose you need to calculate $d$ as follows:

$$d = \max\left(\frac{6}{5}, \min(x, y)\right)$$

Write some Java code that when finished finds $d$ as desired, **without using any methods**, i.e. `Math.max()` or `Math.min()`. Assume all the variables involved have already been declared to be of type double.

Problem (3) [10 points] Assume $x$, $y$, and $z$ are ints that have already been declared.

(a) The following Java code fragment, which is complete except for the if-condition, should print out "**a and b are both between y and z**" if both $a$ and $b$, are between the values of $y$ and $z$.

```java
if ( // condition missing )
    cout << "a and b are both between y and z" << endl;
```

In Java, write the missing condition here:

(b) Suppose you are given four declared variables $d$, $e$, $f$ and $g$ of type int. Write Java code that finds the two median values and put them in $a$ and $b$ from part (a)). For example, if $d=2$, $e=7$, $f=10$ and $g=5$, then $a=5$ and $b=7$ (or $a=7$ and $b=5$)
Problem (4) [10 points] Suppose the user enters an int \( n \). Write a Java code segment that displays a triangle of height \( n \) and base \( n \) using the character ‘\( x \)’. You may assume \( n \) already has a value entered before your code segment (you do not need to read it with a Scanner). Declare any variables other than \( n \) that you use. For example, if \( n=5 \), then the code should display the following:

```
x
xx
xxx
xxxx
xxxxx
```
Problem (6) [10 points] Suppose \( d \) and \( e \) are ints, and consider the following code:

```cpp
if ( (d+e)%2==0 && !(e/10 == d/10 || e > d) )
    cout << "Meets condition" << endl;
else
    cout << "Does not meet condition" << endl;
```

For each of the three cases below, circle whether the code would output "Meets condition" or "Does not meet condition".

(a) \( d = 13, e = 19 \)

Meets condition  
Does not meet condition

(b) \( d = 4, e = 1 \)

Meets condition  
Does not meet condition

(c) \( d = 12, e = 2 \)

Meets condition  
Does not meet condition

(d) \( d = 2, e = 12 \)

Meets condition  
Does not meet condition

(e) \( d = 13, e = 1 \)

Meets condition  
Does not meet condition
Problem (7) [10 points] Find 3 possible places for errors inside the following main() method. Assume there are no errors outside of the main() method (such as improperly importing Scanner) and that the user properly enters an integer. Explain specifically what causes the error and whether it is a syntax, runtime or logic error:

```java
public static void main(String[] args) {
    int start;
    Scanner reader = new Scanner(System.in);
    System.out.println("Enter a number: ");
    start = reader.nextInt();
    System.out.println("Between 0 and "+start);

    for(start > 0)
    {
        if(start % 7 ==0)
        {
            divisible++;
        }
    }

    System.out.println(" there are "+ divisible +
        " number divisible by 7 exactly.\n");
}
```
Problem (8) [10 points] For each of the following, write what is displayed after running the following pieces of code:

(a)

```java
for(int i=1; i < 30; i*=2)
{
    i--;
    System.out.println(i + " , ");
}
```

(b)

```java
int i = 20;
while(i > 0)
{
    i++;
    System.out.println(i + ", ");
    i = i/3;
}
```

(c)

```java
int x = 97, i = 10;
while(x > 0)
{
    System.out.println(x%i + ", ");
    x=x%i;
}
```
Problem (9) [10 points] For each of the following loops, assume a is declared and has value 0 before the loop runs. What is the value of a after the loop? (i.e. how many times did the loop run?)

(a)
for(int i=30; i > 0; i=i/3)
{
    a++; 
}

(b)
int i = 20;
while(i > 0)
{
    i-=((i/2)+1);
    a++; 
}

(c)
for(int i=0; i < 30; i++)
{
    for(int j=0; j < 10; j++)
    {
        a++; 
    }
}