1. Imagine you can only store and use integers with 10 digits. What results when you add 9999999999 + 0000000001?

2. Using a factorial method which returns N! as an int, you get the following results:

   30! = 1409286144
   31! = 738197504
   32! = -2147483648

   What happened?

3. What will the following java fragment print?

   ```java
double x1 = 0.3;
double x2 = 0.1 + 0.1 + 0.1;
StdOut.println(x1 == x2);

double z1 = 0.5;
double z2 = 0.1 + 0.1 + 0.1 + 0.1 + 0.1;
StdOut.println(z1 == z2);
```

4. Is the previous result a consequence of Round Off Error or Catastrophic Cancellation?

5. Will the following java fragment print 0.0?

   ```java
   System.out.println( (.3 - .1 - .1 - .1)*1e15);
   ```

6. Is the previous result a consequence of Round Off Error or Catastrophic Cancellation?

7. Give an example when java will give you NaN.

8. Give an example when java will give you Infinity.

9. What will the following java fragment print?

   ```java
   System.out.println( 1/0 );
   ```

10. What will the following java fragment print?

    ```java
    System.out.println( 1000000000000. + .00001);
    ```

11. Why is an ill-conditioned problem worse than an unstable algorithm?