1. On September 18, 1998, the International Corporation for Assigned Names and Numbers (ICANN) was started, an organization that controls the naming of websites.

   - Explain how Java is different from all other programming languages, and how this difference helps to transfer computations from one computer to another.
   - What programming language(s) was Java based on?

For extra credit: describe one more event from the history of computing.

Java is different because the .java file that the programmer writes is translated to byte-code into a .class file by the Java compiler and this byte-code can run anywhere where a Java interpreter is available or installed. This difference helps transfer computations across computers because the Java interpreter or the Java Virtual Machine translates or interprets the byte-code for the operating system, telling it what to do regardless of where the byte-code came from.

Java was based on the programming language started by Sun Microsystems.

Extra: A woman named Ada is considered to be the first programmer. There is a programming language named after her which is mainly used by the government.
2. For each of the following sequences of symbols, describe which can be valid Java identifiers and which cannot be; if you believe they cannot be, briefly explain why (e.g., "is a reserved word" or "does not start with a letter"): 

- **ICANN**: Valid
- **double**: Invalid; "double" is a type, a reserved word
- **1998**: Invalid, an identifier may not start with a number
- **18September**: Invalid, an identifier may not start with a number
- **Sept-18-1998**: Valid, No dashes not allowed
3. The following formula enables us to compute the area \( a \) of a right triangle with sides \( x \) and \( y \):

\[
\frac{1}{2} xy
\]

Assuming that \( x \) and \( y \) are already placed in the corresponding variables of type double, write a Java code statement for assigning the corresponding value to the variable \( a \) of type double. Explain, step-by-step, which arithmetic operations will be performed first, which next, etc., and trace the computations on the above example. Describe two different ways to avoid getting 0 as the result of evaluating \( 1/2 \). Explain what happens if you simply write \( xy \) in your Java code.

\[
A = (1.0/2) \times x \times y
\]

**Step 1:** Due to the parenthesis the division takes place first, \( (1.0/2) \) since there is a value of type double, the result is 0.5

**Step 2:** Since the rest of the operations are multiplications, they are carried out in left to right order, so 0.5 is multiplied by the value in “x”

**Step 3:** The result from the previous step is multiplied by the value in “y”

**Trace:**

Assuming \( x = 2.0 \) and \( y = 3.0 \)

\[
A = (1.0/2) \times x \times y
\]

\[
A = 1.0 \times 3.0
\]

\[
A = 3.0
\]

Avoid getting 0 ev. \( 1/2 \% \\
use a double \\
Method 1 \% 1.0/2 \\
type cast to double \\
Method 2 \% ((double) 1)/2

What happens with “xy”? "xy" would be read as an identifier by the compiler, which is underlined, resulting in an error.
4-5. To register a website for several years, you need to pay a per-year registration fee. For simplicity, let us take $35 as this fee. Write the main method which asks the user for the URL of the website, asks for how many years we want to register this website, and prints a memo describing the price. For example, if we want to register CS website http://www.cs.ute.p.edu for 3 years, your program should print the following message:

From: ICANN

To register your website http://www.cs.ute.p.edu, you need to pay $35 \times 3 = $105.

Declare 35 as an integer constant, so that it will be easy to change if needed.

Reminder: to read from the keyboard, you can define the reader as follows:

Scanner reader = new Scanner(System.in);

the header of the main method is:

```java
public static void main(String[] args) {
```

```java
// import the scanner class
import java.util.Scanner;
```

```java
class website {
    public static void main(String[] args) {
        final int Fee = 35; // all caps
        int years;
        String website;
        Scanner input = new Scanner(System.in);
        int cost;
        System.out.println("Enter the URL of the website you want to register");
        //
        website = input.next();
        System.out.println("Enter the number of years for which you want to register the website");
        years = input.nextInt();
        // code continues on the back
```
cost = Fee * years;
System.out.println("From: \nICANN \n");
System.out.println("To register your website " + website + ", you need to pay $" + Fee + " x " + years + " = $" + cost");
6. Suppose that you would like to add 2 to the number of years. If the number of years is stored in the integer variable \texttt{years}, which of the two lines of code leads to a correct increase:

- \texttt{years = years + 2.0;}
- \texttt{years = years + 2;}

The second one, the first would output an error because Java doesn't implicitly convert to less precise types.

If originally, before each line, we had 3 years, explain what will happen after each of these lines is implemented by Java. What is a clearer way (different from those above) to add 2 to the variable \texttt{years}?

Diagram:

Using: \texttt{years = years + 2.0;}

\[
\begin{array}{c}
\text{3 years} \\
\text{5.0 error or warning} \\
\text{5.0 is not an integer to Java}
\end{array}
\]

Using: \texttt{years = years + 2;}

\[
\begin{array}{c}
\text{3 years} \\
\text{5 years}
\end{array}
\]

Clearer way to add 2:

\texttt{years += 2;}

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