1. (10 points)
   
   (a) Give 3 valid identifiers in Java, one of which is NOT solely alphabetic, and one of which is not solely alphanumeric.

   (b) Give 3 Java key words which could NOT be used as variable names.

   (c) Give 3 illegal identifiers that are NOT Java keywords.

   (d) Give 1 convention (i.e., not a syntax rule enforced by Java) that you should follow when naming identifiers.
2. (12 points) How many bits are in the following quantities? Be precise. Do not use 1000 for your conversions; recall that for CS ‘kilo’ means a number that is a power of 2 that is close to 1000. Show your work for partial credit.

(a) 3 kilobytes

(b) 36.25 bytes

(c) 32.5 megabytes

(d) 1.2 gigabytes

3. (10 points) ASCII Encoding
Letters in the english alphabet are stored in the computer as numbers (i.e. each letter is encoded as a number). The encoding method used to represent the alphabet is known as the ASCII code (American Standard Code for Information Interchange). The website http://www.ascii-code.com contains ASCII code tables which show the encoding from a a decimal number to an english language character.

(a) Give the series of ASCII characters encoded by the following decimal values:
   112 113 64 23 83 55 48 83 67 72

(b) Give the series of decimal values to encode the following ASCII characters:
   5%_7pP (Z)
4. (20 points) Using ALL (9) of the following terms, describe how we can write a Java program for a computer: byte code, compiler, high-level language, Java, machine language, program, source code (or source files), text editor, and virtual machine.
5. (10 points) Write the values that will be printed to the Terminal by the code below:

```java
int a = 5;
int b = 2;
System.out.println(b++);
System.out.println(b);
System.out.println(b - --a);
System.out.println(a);
System.out.println(a++ + --b + b++ + a++);
System.out.println(a);
System.out.println(b);
```

6. (15 points) Write a program in Java named IntCharConvert. Your program should:

(a) include a comment describing the “high-level” purpose of the program (you should be able to describe this program after reading the requirements below).

(b) prompt the user to enter an integer

(c) read in the integer entered by the user and store it

(d) prompt the user to enter a character

```
   Hint: this is tricky since the Scanner class doesn't provide a nextChar method.
   You will need to get the character from another datatype
```

(e) read in the character entered by the user and store it

(f) print out the integer value of the character and the character value of the integer
7. (20) For the following statements, state whether the statement is correct or has an error. If there is an error, describe it. If there is no error, give the value stored by the assignment statement. Evaluate each statement with the original values of the variables given below.
(Note: You will be asked to do similar problems on exams/quizzes when you will not have access to a Java compiler. I recommend you write these statements inside a Java program after you have done the homework to check your answers — if you have errors, understand why. )

Original values of the variables:

```java
int i1 = 0, i2 = 1, i3 = 5;
double d1 = 2.0, d2 = 3.0, d3 = 7.0;
String s1 = "5", s2 = "!", s3 = "123";
char c1 = 'a', c2 = 'N', c3 = '6';
```

(a) `d1 = i3;`

(b) `i1 = d3 + i2;`

(c) `s1 = i1 + s2;`

(d) `s1 = i2 + i3 + s3;`

(e) `s1 = s3 + i2 + i3;`

(f) `c2 = (int)(c3 + i3);`

(g) `s1 = s2 + c2;`

(h) `c3 = s3;`

(i) `i2 = c2 + i3;`

(j) `c2 = s3.charAt(i3 - i2);`
8. Algorithm tracing  Consider the following algorithm written in pseudocode:

\[\begin{align*}
  b &= 3; \\
  c &= 0; \\
  &\text{as long as } c \text{ is less than 4:} \\
  &\quad b = b \times 10; \\
  &\quad c = c + 1;
\end{align*}\]

//complete table entries below

(a) (10 points) Fill out the table below and trace each step (or loop) of the algorithm above (see comment). The initial state has been completed for you. Use only as many rows as you need.

<table>
<thead>
<tr>
<th></th>
<th>(b)</th>
<th>(c)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial</td>
<td>3</td>
<td>0</td>
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<tr>
<td>Step 1</td>
<td></td>
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<tr>
<td>Step 7</td>
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</tbody>
</table>

(b) (5 points) In your own words, explain what the values of \(b\) and \(c\) are after the algorithm finishes. DO NOT simply restate the algorithm.