Name: ______________________________________
Collaboration Statement: (Read the syllabus if you're unsure what to write here.)

1. (10pts)
   a) Give 3 valid identifiers in Java, two of which are NOT solely alphabetic.

   b) Give 3 Java keywords 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. (10pts) Using Google or another search engine of your choice, find the minimum and maximum integer values which can be represented by the following Java datatypes. Also for each datatype, how many bits would be required to encode such an integer?
   a) byte

   b) short

   c) char

   d) int

   e) long
3. (9pts) How many bits are in the following quantities? Be precise. Do not use 1000 for your conversions. Show your work for partial credit.
   a) 2 kilobytes
   
   b) 28.5 bytes
   
   c) 3.25 megabytes

4. (10pts) ASCII Encoding
   Letters in the English alphabet are stored inside the computer as numbers. That is, 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 shows the encoding from a decimal number to an English language character.
   a) Give the series of ASCII characters encoded by the following decimal values:
      83 112 114 46 32 67 83 49 55 48 33
   b) Give the series of decimal values to encode the following ASCII characters:
      4%_5P aA)V

5. (7 pts) Write the values that will be printed to the Terminal by the code below:
   ```java
   int x = 3;
   int y = 5;

   System.out.println(y++);
   System.out.println(y);
   System.out.println(--y);
   System.out.println(y);
   System.out.println(x++ + --y + y++ + x++);
   System.out.println(x);
   System.out.println(y);
   ```
6. (22pts) 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 the midterm and 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. You can check your answers --- if you have errors, understand why.)

Original values of the variables:

```java
int    i1 = 0,   i2 = 3,   i3 = 7;
double d1 = 2.0, d2 = 3.0, d3 = 6.0;
String s1 = "5", s2 = "!", s3 = "123";
char   c1 = 'a', c2 = 'N', c3 = '8';
```

a)    i2 = i3;
b)    d1 = -d2;
c)    i1 = i2 + i3;
d)    d1 = i1 + i3;
e)    d1 = i2 + d2;
f)    i1 = i3 + d1;
g)    i3 = i3 % i2 + i1;
h)    s1 = i1 + i3;
i)    s1 = s2 + s3;
j)    s1 = i1 + s1;
k)    s1 = i2 - i3 + s3;
l)    s1 = s3 + i2 - i1;
m)    s1 = s3 + i2 * i1;
n)    c1 = (int)(c3 + 5);
o)    s1 = s2 + c3;
p)    c1 = s1;
q)    c1 = c2 + (char)5;
r)    i1 = c3 + 5;
s)    i1 = c2;
t)    i1 = s3.length();
u)    c2 = s3.charAt(i3-i2);
v)    c2 = s3.charAt(i1);
7. (15 pts) 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
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
8. Algorithm tracing – Consider the following algorithm written in pseudocode:

```plaintext
i = 5216;
d = 0;
s = 0;
c = 0;
as long as i does not equal 0:
    d = i % 10;
i = i / 10;
s = s + d;
c = c + 1;
//complete table entry below
```

a) (12pts) 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>Step</th>
<th>i</th>
<th>d</th>
<th>s</th>
<th>c</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial</td>
<td>5216</td>
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</table>

b) (5pts) In your own words, explain what the values of s and c are after the algorithm finishes. DO NOT simply restate the algorithm. How do the values of s and c relate to the original value of i?