CS 100: Prelim 1

February 16, 1999

7:30-9:00pm

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(Print Name)

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(Signature)

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(Student ID)

Initial each of the following five(5) pages. For the sake of partial credit, you must show work and comment your solution fragments as appropriate. If you need space, write on the reverse side.

1. __________ (20 pts)

2. __________ (20 pts)

3. __________ (20 pts)

4. __________ (20 pts)

5. __________ (20 pts)

Total = __________ (100 pts)

1. (a) What output would the following Java fragment produce:

```
int k, x, y;
x = 1;
y = 5*x;
for (k=1; k<=3; k=k+1)
{
   x = 2*x;
   System.out.println("    "  +  x +  "    " + y);
}
```

(b) What output would the following Java fragment produce:

```
int  x = 64;
while (x  > 10)
{
  x  = x / 2;
  System.out.println(x);
}
```

2. (a) Assume that x is a type double variable with positive value. Write a Java fragment that assigns the value of its ones digit to a type int variable d. Here are some clarifying examples:

x	d
13.2	3
0.72	0
10.72	0
1782.62	2

Indicate clearly the type of every variable used in your solution.

(b) Assume that x, y, and z are type int variables with positive value. Write a single Java statement that assigns their average to a type double variable ave.

3. (a) A triangle is a right triangle if the square of one side is the sum of the squares of the other two sides. Assume that a, b, and c are type int variables with a positive values *a*, *b*, and *c* respectively. Complete the conditional so that the following if-statement prints "Right Triangle" if a triangle with sides having length *a*, *b*, and *c* is a right triangle.

```
if (______________________________________________________________ )

    {
    System.out.println( "Right Triangle" );
    }
```

(b) A triangle is an equilateral triangle if its three sides have equal length. Assume that a, b, and c are type int variables with a positive values *a*, *b*, and *c* respectively. Complete the conditional so that the following if statement prints "Equilateral Triangle" if a triangle with sides having length *a*, *b*, and *c* is an equilateral triangle.

```
if (______________________________________________________________)

    {
    System.out.println( "Equilateral Triangle" );
    }
```

4. Let s_j be the value obtained when the cube of the first *j* positive integers are summed. Thus

$$s_1 = 1^3 = 1$$

$$s_2 = 1^3 + 2^3 = 9$$

$$s_3 = 1^3 + 2^3 + 3^3 = 36$$

$$s_4 = 1^3 + 2^3 + 3^3 + 4^3 = 100$$

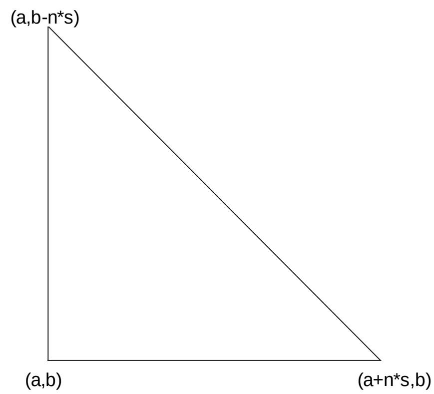
Write a Java fragment that assigns to the long variable jmin the smallest value of *j* for which s_j is strictly bigger than the value of a positive constant N. You may assume that N has type long. You can use Math.pow if you want. Indicate clearly the type of each variable involved in your solution. Here is a table that clarifies the connection between N and jmin:

N	jmin
4	2
9	3
90	4

5. The Java fragment

```
g.drawLine(a,b,a+n*s,b);
g.drawLine(a+n*s,b,a,b-n*s);
g.drawLine(a,b-n*s,a,b);
```

draws a 45° right triangle with vertices at (a,b), (a+n*s,b), and (a,b-n*s) where a, b, n, and s are *given* positive integer constants:



(The labels are not part of the graphic.) Assuming that the triangle is drawn, write a Java fragment that draws a horizontal line from (a,b-k*s) on the vertical leg to the hypotenuse for k=1,…,n-1. Thus, if n = 7, then after your fragment executes the following should be displayed: