No.: _____ Name: _____

Computer Science
Homework for Chapter 12 **Due: 2010/06/15**

_____1. An unsolvable problem is a problem for which

A. no solution exists.
B. no one knows the solution.
C. no algorithm exists for finding the solution.
D. no one wants to known the solution.

_____2. Suppose the variables X and Y in the following Bare Bones program have the values 3 and 2, respectively, when execution begins.

```
clear Z;
while X not 0 do;
   while Y not 0 do;
      decr Y;
      incr Z;
   end;
   incr Z;
   decr X;
end;
```

What will be the value of Z when the program terminates?

A. 0 B. 1 C. 5 D. 6

_____3. The class of problems known as NP is so named because it is composed of which of the following?

A. Non-polynomial problems
B. Non-programmable problems
C. Non-universal problems
D. Non-deterministic polynomial problems

_____4. If an RSA public key encryption system were based on the primes p = 3 and q = 7, which of the following pairs of values would be suitable for the encryption and decryption keys e and d?

A. 2 and 6 B. 5 and 29 C. 4 and 9 D. 7 and 23

_____5. Which of the following is the most precise classification of a problem X?

A. X is in NP.
B. X is in P.
C. X is in $O(n^2)$.
D. X is in $\Theta(n^2)$.

6. List the following complexity classes in order of increasing complexity.

$\Theta(n^3)$, $\Theta(2^n)$, $\Theta(\lg n)$, $\Theta(n)$, $\Theta(n \lg n)$, $\Theta(n!)$

ANSWER: _____

7. In the following table, connect the term to each phrase that gives the best description of the term. (40%)

Term		**Descriptive Phrase**
nonpolynomial problems	_____	**A.** A relationship between input and output values that can be determined algorithmically
merge sort algorithm	_____	**B.** An elementary, yet universal, computing device
private keys	_____	**C.** The conjecture that the Turing-computable functions are the same as the computable functions
Turing computable	_____	**D.** Solvable by a Turing machine
Insertion sort algorithm	_____	**E.** An example of an unsolvable problem
unsolvable problem	_____	**F.** Allows a solution to any solvable problem to be expressed
RSA	_____	**G.** A problem with no algorithmic solution
P	_____	**H.** A class of problems whose time complexity is not yet completely understood
Church-Turing thesis	_____	**I.** The problems that have a polynomial time solution
universal language	_____	**J.** Problems with a high time complexity
nondeterministic algorithm	_____	**K.** May not perform the same if repeated in the identical environment
NP	_____	**L.** Has time complexity of $(n \lg n)$
computable function	_____	**M.** An NP complete problem
Turing machine	_____	**N.** The decryption values in a public key encryption system
halting problem	_____	**O.** A public key encryption system
traveling salesman problem	_____	**P.** Has time complexity of (n^2)