HW 4: 6, 7, 9, 14, 17, 19, 23, 29, 30, 48

6. CSMA/CA (Carrier Sense Multiple Access/Collision Avoidance).

7. Wait for bus to become silent;
   start transmitting;
   if collision occurs, wait before trying again.

9. A MAC address is a physical address which is a 48-bit address, identified by a bridge and used in data link layer. An IP address is a logical address which is 32-bit (IPv4), identified by a router and used in network layer.

14. a. 5.18.35

   b. 128.32

   c. 48.24

17. DNS spoofing is a type of cyber crime where the DNS IP address is changed by a fake IP address.

19. The component "john" is the name of the receiver of the message; "yahoo.co" identifies the mail server that should receive the email; "in" is the country domain.

23. a. CGI (Common Gateway Interface) is a framework for creating server side applications.

   b. FTP (File Transfer Protocol) is an Application Layer Protocol which can be used to transfer a file.

   c. ISP (Internet Service Providers) provides internet services to the customer.

29. <html>
   <head>
           <title>First Web Page</title>
   </head>
   <body>
   <h1>Networking Fundamentals</h1>
   <img src = "Mesh_Topology.jpg">
   </body>
   </html>

30. Answers should vary widely. They may include such tags as <exp> and </exp> to indicate the beginning and end of an exponent, or perhaps <quo><num>x + y</num><div>xy</div></quo> to represent (x + y)/(xy).

48. Public-key encryption is a system by which messages can be encrypted using a publicly known encoding key but deciphered only by using a private decoding key.

HW 5: 5, 8, 11, 12, 13, 16, 21, 39

5. No. The process described will never terminate because the value of Var will never be 10.

8. One answer would be

```
Var        ← 2;
    while (Var < 10) do
    (print the value assigned to Var and
Var        ← Var + 2)
```

11. Suppose N is the given integer. Then the following will work. You may want to ask your students how this solution could be made more efficient.

```
   X ← 1
   while (X ≤ N) do
   (if (X divides N) then report X
    X  X + 1
    )
```

12.

Iteration	Recursion
It is a process of executing a statement or a set of statements repeatedly, until a condition is specified.	Recursion is the technique of defining anything in terms of itself.
Iteration involves four clear-cut steps: initialization, condition, execution, and updation.	There must be an exclusive if statement inside the recursive function, specifying stopping condition.
Any recursive problem can be solved iteratively.	Not all problems have recursive solutions.
The iterative counterpart of a problem is more efficient in terms of memory utilization and execution speed.	Recursion is generally a worse option to go for when it comes to simple problems, or problems that are not recursive in nature.

13. Top-down methodology progresses from the general to the specific. Bottom-up methodology progresses from the specific to the general.

16. V = 0, W = 4, X = 1, Y = 3, Z = 9. Most will get their foot in the door by realizing that X must be 1 since X times XY is XY. Then they may discover that Z must be 9 since it must be a one-digit perfect square (Y times Y) which when added to one produces a carry.

21. How about this?

```
procedure SameStringSearch(FirstString, SecondString)
Success ←     true
if(length of FirstString) != length of SecondString)
 Success  ←  false
else
     P  ←  1
     while (P <= length of FirstString and Success = true) do
       if (Pth character in SecondString != Pth character in FirstString)
         [ Success  ←  false
         P  ←  P + 1]
if (Success = true)
then (declare both string are same)
else (declare strings are different)
```

39. a. Remove the first name from the list, leaving a list of only four names. Use the previous algorithm to sort this shorter list. Then, insert the name removed earlier into this sorted list at its correct position.

   b.

```
procedure Sort (List)
if (List has more than one name)
      then (Remove the first name from List,
          Apply sort to the remaining portion of List,
          Insert the name removed earlier into the
                sorted list at its correct position)
```

HW 6: 7, 13, 14. 31, 35, 39, 50, 51

7. The answer cannot be predicted directly; it will depend on the values of w, x, y, z.

13. The declarative part of the program contains the programmer-defined terminology; the procedural part contains the steps in the algorithm to be executed.

14. A literal is a specific value appearing as itself; a constant is a name for a fixed value; a variable is a name whose associated value can change as the program executes.

31. 5, 9, 9

35. a. A formal language is defined by its grammar, whereas the grammar of a natural language is merely an attempt to explain the structure of a natural language.

b. Programming languages such as C, C++, Java, and C# are formal languages. Examples of natural languages include English, Spanish, Italian, etc.

39. Answers will vary. The top level diagram might indicate that the date can be expressed in different ways. Then, other diagrams would reveal the details of each approach.

50. Encapsulation refers to the restriction on the access to an object's internal property.

51. Answers will vary.