10 points for each question.

1. If a two-dimensional array of $11_{(10)}$ rows and $15_{(10)}$ columns is stored in row major order beginning at memory address $3000_{(16)}$, what is the address of the entry in the seventh row, fifth column? Suppose each entry occupies four memory cells. (The result should be in the Hexadecimal representation)

2. Suppose the procedure Operation is defined by

   ```
   procedure Operation (y)
   y = y + 6;
   x = y - 3;
   print out the value of x and y; --------------- location a
   end of procedure
   ```

   Also suppose that $x$ is a global variable, and the following program fragment is executed.

   ```
   x = 9;
   apply the procedure Operation(x);
   print out the value of x; --------------- location b
   ```

   (a) If parameters are passed by value, what will be printed out at location a and b, respectively?
   (b) If parameters are passed by reference, what will be printed out at location a and b, respectively?

3. In what way could TCP be considered as a better protocol for implementing the transport layer than UDP? In what way could UDP be considered better than TCP?

4. What are the best case and worst case when performing the quick-sort, respectively? What are the time complexities of the best case and worst case, respectively? Supposing the input data is 37, 57, 23, 15, 32, please specify the respective results after each processing phase of the quick-sort.
5. (a) Suppose that a file is 500M bytes in size and is transferred by a telephone line at the rate of 14400 bps. How long would it take to download the file?
(b) Please change the IP address, 01111110 11110001 01100111 01111111, from the binary notation to the dotted-decimal notation and determine which class of networks the IP belongs to.

6. Please use the given sequence of the following input characters to construct the corresponding complete binary tree and write out the respective inorder, preorder, and postorder traversals for your tree.

7. Please compare the differences between
(a) optical zoom and digital zoom for a digital camera,
(b) optical resolution and interpolation resolution for a scanner.

8. How do you think that the distance learning will impact education?

9. Suppose that there are 5 algorithms with time complexities $O(n \log n)$, $O(n^2)$, $O(\log^2 n)$, $O(2^n)$ and $O(\log n^2)$, respectively. Please discuss their efficiencies.

10. Please explain the following terms as details as possible:
(1) deadlock  (2) recursion  (3) EDI  (4) XML  (5) DNS