POINTERS IN C: Problems for Practice

1. ***Predict the output of the following program. Then run the program and see if your expectation is matched:***

```
#include <stdio.h>

void swap1(int,int);
void swap2(int *, int *);

int main()
{
  int a, b;
  printf("Enter first number: ");
  scanf("%d", &a);
  printf("Enter second number: ");
  scanf("%d", &b);
  getchar();

  printf("\nBefore swapping...\n\t a = %d, b = %d\n", a, b);
  printf("Press <Enter> to continue...");
  getchar();

  swap1(a,b);
  printf("\nAfter swapping using swap1()...\n\t a = %d, b = %d\n",
                                                  a, b);
  printf("Press <Enter> to continue...");
  getchar();
  swap2(&a, &b);
  printf("\nAfter swapping using swap2()...\n\t a = %d, b =
                                                  %d\n\n", a, b);

  return 0;
}

void swap1(int a, int b)
{
  int temp;
  temp = a;
  a = b;
  b = temp;
  return;
}

void swap2(int *pa, int *pb)
{
  int temp;
  temp = *pa;
  *pa = *pb;
  *pb = temp;
  return;
}
```

2. ***Which of the following manipulations (done sequentially) is not legal in C? Explain why you think so.***

Consider the declarations: `int *p, arr[10] = { 10, 20, 30}, i = 10;`

(a) `arr = arr + 1;`

(b) `p = arr;`

(c) `p = p + 1;`

(d) `arr[2] = 20;`

(e) `p[2] = 20;`

(f) `arr = NULL;`

(g) `p = NULL;`

(h) `p = &arr[2];`

3. The function `findMax()` ***finds out the largest integer in a given array and returns it to the calling function. Can you find out the mistakes in the following program written to accomplish this task?*** *(Write down the correct statements on the side, right next to the line of code.)*

```
1  int findMax(int &a, n)
2  {
3   int max, i;
4   max = a[0];
5   for (i = 1; i <= n; ++i)
6      if (a[i] > max) a[i] = max;
7   return a;
8  }
9
10 int main()
11 {
12   int N, i, mx;
13   printf("How many numbers? ");
13   scanf("%d", &N);
14   int arr[N];    /* variable length array */
15   for (i = 0; i < N; ++i)
16      scanf("Enter number %d", arr[i]);
17    mx = findMax(arr[],&N);
18    printf("Largest number of the list is: %d\n", N, mx);
19   return 0;
20  }
```

4. ***Given a square matrix as input, what logic will you employ to find if it is: (write only the condition to be checked)***

(a) a diagonal matrix

(b) upper triangular matrix

(c) lower triangular matrix