Pointers

1. Write a declaration to store the following values in a static array named as rates: 12.9, 19.6, 11.4, 13.7, 9.5, 15.2, 17.6. Use this declaration to display the values stored in the array by **using the pointer notation.**

   A sample run for the array [12.9, 19.6, 11.4, 13.7, 9.5, 15.2, 17.6] would be as follows:
   Values stored in the array are as follows: [12.9, 19.6, 11.4, 13.7, 9.5, 15.2, 17.6]

2. Update program in part (1) such that your program gets the number of students from the user, and then dynamically allocates enough memory for that array. Write a program that asks the user for the number of students, n, in the class, dynamically allocates enough space in memory for n grades and generates n random grades (using rand()) between 0 and 100 (minimum 0 and maximum 100) which it stores in this space. Display the stored grades.

   A sample run would be as follows:
   How many students you have? 2
   Their grades are as follows:
   Student 1: 40 Student 2: 30

3. Write a program that declares three single-dimensional arrays named as miles, gallons, and mpg. Each array should be capable of holding 10 elements. In the miles array, store the numbers 240.5, 300.0, 189.6, 310.6, 280.7, 216.9, 199.4, 160.3, 177.4, 192.3. In the gallons array store the numbers: 10.3, 15.6, 9.7, 14, 16.3, 15.7, 14.9, 10.7, 9.3, 9.4. Each element of the mpg array should be calculated as the corresponding element to the miles array divided by the equivalent element of the gallons array; for example, mpg[0] = miles[0]/gallons[0]. Use **pointers** when calculating and displaying elements of the mpg array.

4. Show the output of the following program:

```
 #include<stdio.h>
int main()
{ int i=10,j=0,*p;
  p=&i;
 printf("i=%d\n",i);
 printf("j=%d\n",j);
 printf("address of i=%x\n",&i);
 printf("p=%x\n",p);
 printf("*p=%d\n",*p);
 *p=20;
 j=*p;
printf("\n\nAFTER\n");
printf("i=%d\n",i);
printf("j=%d\n",j);
printf("address of i=%x\n",&i);
printf("p=%x\n",p);
printf("*p=%d\n",*p);
```

```
return 0;
}
```

5. Suppose the following declarations are in effect:

```
int a[] = {5, 15, 34, 54, 14, 2, 52, 72};
 int *p = &a[1], *q=&a[5];
```

   i) What is the value of *(p+3)?
   ii) What is the value of *(q-3)?
   iii) What is the value of q-p?
   iv) Is the condition p<q true or false?
   v) Is the condition *p<*q true or false?

6. Show the output of the following C program

```
int main()
{ float a=0.01;
  float b=0.03;
  float c, *pa, *pb;
  pa=&a;
 *pa=2*a;
  pb=&b;
  c=3*(*pb-*pa);
  printf("a=%.2f\n",a);
  printf("address of a=%p\n",&a);
  printf("b=%.2f\n",b);
  printf("address of b=%p\n",&b);
  printf("c=%.2f\n",c);
  printf("&pa=%p\n",&pa);
  printf("pa=%p\n",pa);
  printf("*pa=%.2f\n",*pa);
  printf("&(*pa)=%p\n",&(*pa));
   return 0;
}
```