**A. Questions**

1. Declare the following:
   1. A structure type with tag book and members author (20-byte char array), title (40-byte char array), and year (int).
   2. A variable of type struct book, as declared in a), named book1.
   3. A variable of type struct book, as declared in a), named book2 and initialized with “Pohl”, “A Book on C”, and 1990 for author, title and year, respectively.
   4. A new type book\_t based on struct book using typedef.
   5. A variable named p which is a pointer to an int.
   6. A variable named q which is a pointer to an int and initialized to NULL.
   7. A variable named r which is an array of 10 pointers to int.
   8. A variable named s which is a pointer to an array of ints.
   9. A variable named str which is a pointer to a string.
   10. A variable named message which is a pointer to string literal "Hello, world".

Answers:

a)

struct book {

char author[20];

char title[40];

int year;

};

b) struct book book1;

c) struct book book2 = {"Pohl", "A Book on C", 1990};

or

struct book book2 = {

.author = "Pohl", .title = "A Book on C", .year = 1990 };

Or

struct book book2 = {

author: "Pohl", title: "A Book on C", year: 1990 };

d) typedef struct book book\_t;

e) int \*p;

f) int \*q = NULL;

g) int \*r[10];

h) int \*s;

i) char \*str;

j) char \*message = "Hello, world";

1. Consider the following C snippet:

char c = 'A', d;

char \*cp;

a) Write a statement to let cp point to c (that is, assign the address of c to cp).

b) Write a statement to assign the value 'B' to whatever cp points to.

c) Write a statement to assign the value of whatever cp points to d.

Answers:

a) cp = &c;

b) \*cp = 'B';

c) d = \*cp;

1. Consider the following C snippet:

1 int a[] = {1, 2, 3, 4};

2 int \*p = a;

3 p++;

4 p = p+2;

a) Draw a graphical illustration of the array a and the and the pointer p after the address of a is assigned to p (line 2).

b) Draw a graphical illustration of the array a and the and the pointer p after p is incrementd (line 3).

c) Draw a graphical illustration of the array a and the and the pointer p after line 4.

Answers:

a

a)

4

3

2

1

p

a

b)

4

3

2

1

p

a

c)

4

3

2

1

p

1. Consider the following C snippet:

int a[] = {1, 2, 3, 4, 5, 6, 7, 8};

int \*p = a;

Determine the values of the following:

a) a[0]

b) \*p

c) \*(a+1)

d) \*(p+2)

Answers:

a) 1

b) 1

c) 2

d) 3

1. Consider the following C snippet:

char str1[] = "Hello, world";

char \*str2 = "Hello, world";

Determine whether the following statements are valid/invalid:

a) str1[0] = 'h';

b) str2[0] = 'h';

c) strcpy(str1, "NWEN241");

d) strcpy(str2, "NWEN241");

Answers:

a) Valid

b) Invalid

c) Valid

d) Invalid