

A. Questions

1) Declare the following:

- a) A structure type with tag `book` and members `author` (20-byte char array), `title` (40-byte char array), and `year` (int).
- b) A variable of type `struct book`, as declared in a), named `book1`.
- c) 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.
- d) A new type `book_t` based on `struct book` using `typedef`.
- e) A variable named `p` which is a pointer to an `int`.
- f) A variable named `q` which is a pointer to an `int` and initialized to `NULL`.
- g) A variable named `r` which is an array of 10 pointers to `int`.
- h) A variable named `s` which is a pointer to an array of `ints`.
- i) A variable named `str` which is a pointer to a string.
- j) 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";
```

2) Consider the following C snippet:

```
char c = 'A', d;
char *cp;
```

- Write a statement to let `cp` point to `c` (that is, assign the address of `c` to `cp`).
- Write a statement to assign the value 'B' to whatever `cp` points to.
- Write a statement to assign the value of whatever `cp` points to `d`.

Answers:

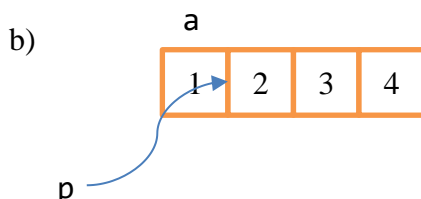
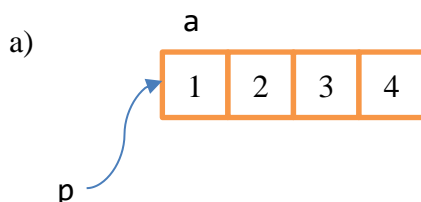
```
a) cp = &c;
b) *cp = 'B';
c) d = *cp;
```

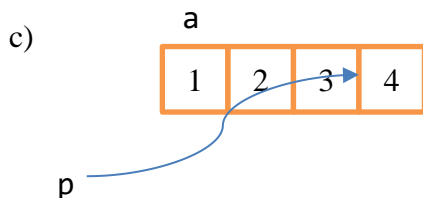
3) Consider the following C snippet:

```
1 int a[] = {1, 2, 3, 4};
2 int *p = a;
3 p++;
4 p = p+2;
```

- Draw a graphical illustration of the array `a` and the pointer `p` after the address of `a` is assigned to `p` (line 2).
- Draw a graphical illustration of the array `a` and the pointer `p` after `p` is incremented (line 3).
- Draw a graphical illustration of the array `a` and the pointer `p` after line 4.

Answers:





4) 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

5) Consider the following C snippet:

```
char *str1[] 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