

CS & IT ENGINEERING

Programming in C

Arrays and Pointer

DPP 02 Discussion Notes



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TOPICS TO BE COVERED

01 Question

02 Discussion

Q.1

Consider the following program:

[MCQ]

#include<stdio.h>

int main()

{

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

int *p[5]={a, a+1, a+3, a+2, a+4};

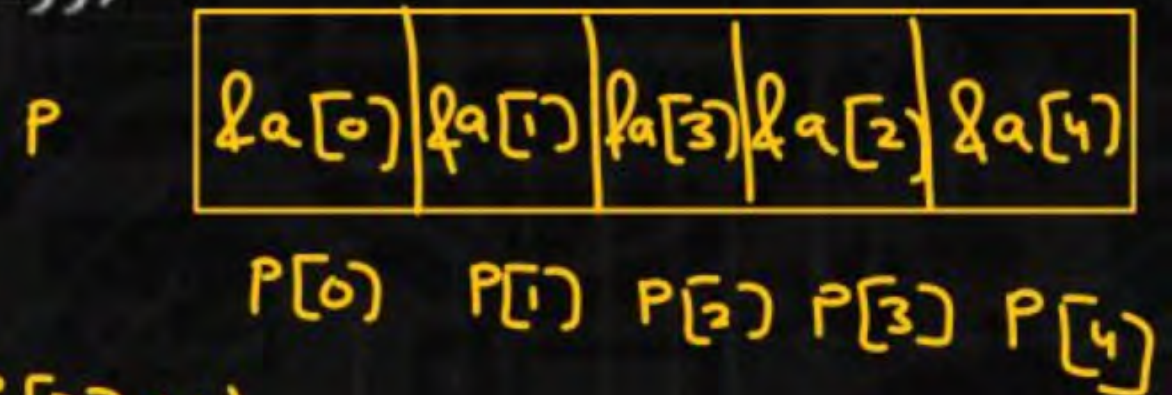
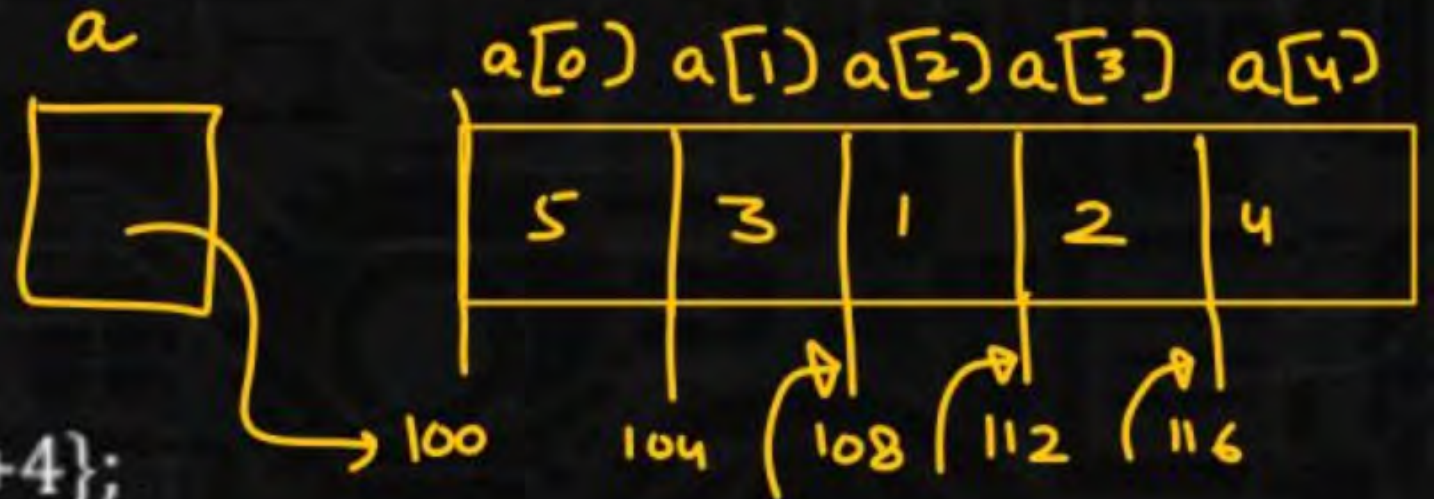
printf("%u\t%u", p[3][1], *(*(p+4)-2));

return 0;

}

The output is:

$$\&a[0] + 1 \Rightarrow \&a[1]$$



$$p[3][1] \Rightarrow *(p[3] + 1)$$

$$\Rightarrow *(\&a[2] + 1)$$

$$\&a[3] = a[3]$$

Garbage value

A.

5 3

B.

4 1

D.

Garbage value

C.

2 1

$$\begin{aligned} & \rightarrow (p[4] - 2) \\ & \rightarrow (\&a[4] - 2) \\ & \rightarrow \&a[2] \\ & = a[2] \end{aligned}$$

Q.2

Consider the following program:

```
#include <stdio.h>
int main()
{
    int a[]={2, 4, 6};
    int b[]={1, 3, 5};
    int *arr[]={a, b};
    printf("%u\t", *((arr+1)+2)); /*line 1*/
    printf("%u\t", **arr+3); /*line 2*/
    printf("%u", ***arr); /*line 3*/
    return 0;
}
```

Which of the following lines does not give ERROR?

A.

Line 1 only

B.

Line 1 and Line 2 only

C.

Line 3 only

D.

Line 2 and Line 3

[MCQ]



a

a[0]	a[1]	a[2]
2	4	6

b

b[0]	b[1]	b[2]
1	3	5

arr[0]	arr[1]
&a[0]	&b[0]

arr[0] arr[1]

arr + 3

arr[0] + 3

arr[0] + 3

a[0] + 3

2 + 3

(arr + 1)

⇒ arr[1]

(&b[0] + 2)

⇒ b[2]

⇒ 5

Invalid

arr

Error

Q.3

Consider the following function:

```
void f(int *p, int n)
```

```
{
```

```
  static int i;
```

```
  i=n-1;
```

```
  if(i<0) return;
```

```
  printf("%d\t", p[i]+p[n-i-1]);
```

```
  f(p,n-1);
```

```
}
```

If the array arr with elements [1, 2, 3, 4, 5] is passed as f(arr, 5), the output is-

~~A.~~

5 4 3 2 1

C.

6 5 4 3 2

~~B.~~

7 6 5 4 3

D.

2 3 4 5 6

arr

1	2	3	4	5
---	---	---	---	---

100

104

108

112

116

 $f(100, 5)$ $f(100, 4)$ $f(5)$ $f(100, 3)$ $f(4)$ $f(100, 2)$ $f(3)$ $f(100, 1)$ $f(2)$ $f(100, 0)$ ~~0 4 3 2 1~~ $P[0] + P[1+0-1]$ $P[0] + P[0]$ $f(6)$ **[MCQ]** $P[2] + P[3-2-1]$ $P[2] + P[0]$

3 + 1

= 4

 $P[1] + P[0]$

2 + 1

Q.4

Consider the following program:

```
#include<stdio.h>
```

```
int main()
```

```
{
```

```
int a[5]={5, 3, 1, 2, 4};
```

```
int *p[5]={a+3, a+1, a, a+2, a+4};
```

```
int **ptr=p+3;
```

```
printf("%u\t%u\t%u", ptr-p, *ptr-a, **ptr);
```

```
return 0;
```

```
}
```

The sum of the output is 321.

$a \Rightarrow \&a[0]$

$a+3 \Rightarrow \&a[0]+3$
 $\&a[3]$

$a[0]$	$a[1]$	$a[2]$	$a[3]$	$a[4]$
5	3	1	2	4
100	104	108	112	116

$\&a[3]$	$\&a[1]$	$\&a[0]$	$\&a[2]$	$\&a[4]$
$p[0]$	$p[1]$	$p[2]$	$p[3]$	$p[4]$
200	204	208	212	

p

$p = \&p[0]$

$ptr = \&p[0] + 3 = \&p[3]$

(ii) $ptr - a$

$\&p[3] - \&a[0]$

$\&a[2] - \&a[0]$
 $= \frac{108 - 100}{4} = \frac{8}{4} = 2$

[NAT]



$ptr - p$

$\&p[3] - \&p[0]$

$212 - 200$

$= \frac{12}{4} = 3$

(iii)

$ptr - a$

$\&p[3]$

$\Rightarrow \&p[3]$

$\&a[2]$
 $= a[2]$

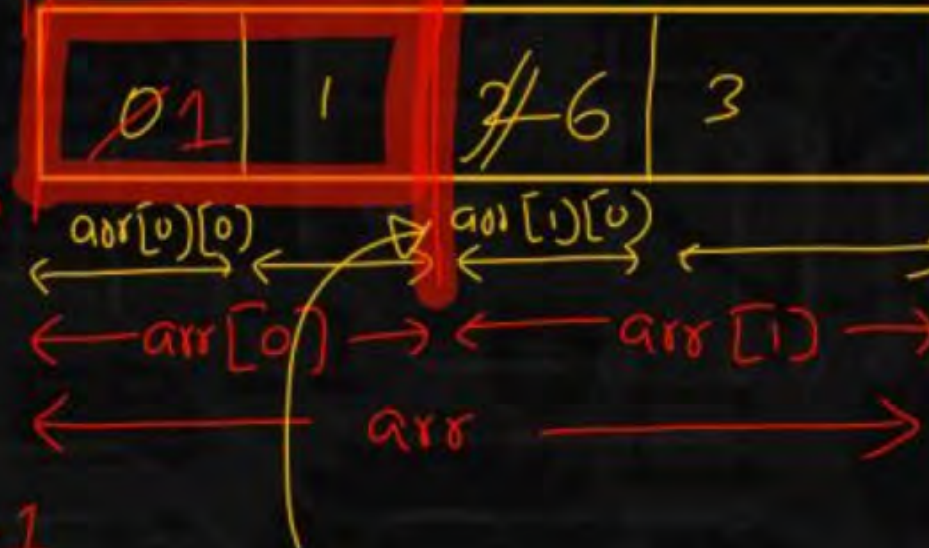
Q.5

Consider the following function:

```
void func(int (*ptr) [2])
```

```
{  
    **ptr+=1;  
    ✓ ptr++;  
    **ptr*=3;  
}
```

$**ptr = **ptr + 1$
 $arr[0][0] = arr[0][0] + 1$
 $ptr = ptr + 1$



[MCQ]



$fun(arr)$
 \downarrow
 $\&arr[0]$
 $**ptr \Rightarrow **\&arr[0]$
 $\&arr[0]$
 $\&arr[0][0]$

The array `arr[2][2]` with elements {0, 1, 2, 3} is passed to `func()`. What are the contents of the array after calling `func()`?

(ii) $ptr++ \Rightarrow ptr$ $\&arr[1]$

$**ptr = **ptr \times 3$

$**ptr \Rightarrow **\&arr[1]$

$\&arr[1]$

$\&arr[1][0]$

$arr[1][0] = arr[0][0] \times 3$

A. 1 1 6 3

B. 0 1 2 3

C. 1 1 2 3

D. Compilation Error.

Q.6

Consider the following program:

```
#include<stdio.h>
int main()
{
    int a[3][2]={1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23};
    printf("%u\t", a+1);
    printf("%u\t", *a+1);
    printf("%u\t", **a+1);
    printf("%u\t", ***a+1);
    printf("%u\t", &a+1);
    return 0;
}
```

Assume the base address of a is 100 and integer size is 2 bytes, the output is-

A.

124 112 102 2 106

C.

112 106 102 2 124

B.

124 102 112 5 106

D.

112 106 102 5 124

[MCQ]



$a[2][3][2]$

$*(*a)+1$

$\Rightarrow *a[0][0]+1$

$\Rightarrow \&a[0][0][0]+1 \times 2 = 102$

$\&a[0]+1 \Rightarrow \&a[0]+1 \times 12 = 112$

$*a+1 = \&a[0]+1 \Rightarrow a[0]+1 = \&a[0][0]+1$

$*(*a)+1 \Rightarrow *a[0][0][0]+1 = 1+1 = 2$

$\&a+1 \times 24 = 124$

(C)

Q.7

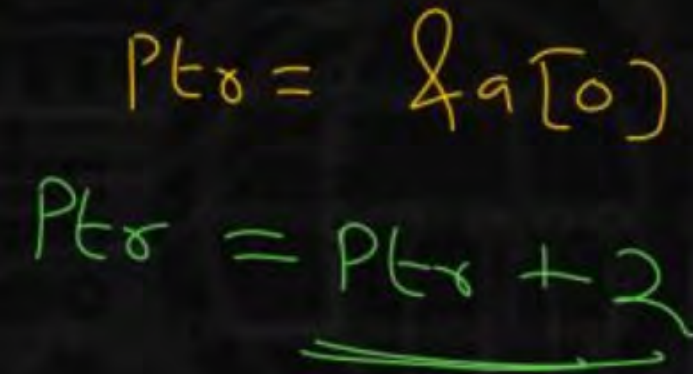
```
#include<stdio.h>
```

 $\{$

```
int *ptr=a;
```

```
printf("%d", *ptr);
```

The output is 65.



Q.8

Consider the following program:

#include<stdio.h>

int main()

{

³
int a[][2]={1, 3, 5, 7, 9, 11};

int *ptr=a[1];

++*ptr++;

printf("%d", *ptr);

return 0;

}

The output is-

A.

5

B.

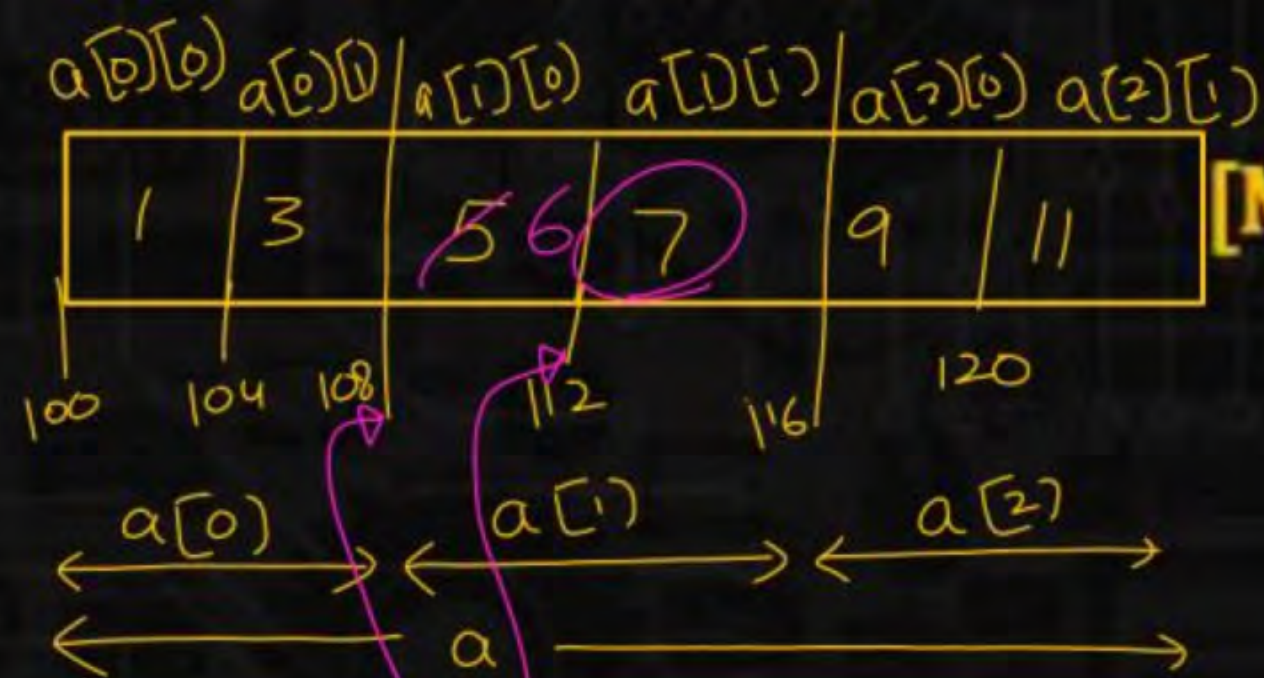
9

C.

7 ✓

D.

Compilation error

[MCQ]

Handwritten notes explaining the pointer arithmetic:

- $ptr = \&a[1][0]$
- $ptr = \&a[1][0] ++ (*ptr++)$
- $ptr = ptr + 1$
- $a[1][0] = a[1][0] + 1$
- $ptr = ptr + 1$

