

CS & IT ENGINEERING

Programming in C

Arrays and Pointers

Lec- 06



By- Pankaj Sharma sir

TOPICS TO BE COVERED

Arrays and Pointers

$\text{int} \rightarrow 2000$ $\text{int} \rightarrow 4 \text{ byte}$

Ans - 2015

$\text{unsigned int } x[4][3] = \{ \{1, 2, 3\}, \{4, 5, 6\}, \{7, 8, 9\}, \{10, 11, 12\} \};$

$\text{printf(" \%u \%u \%u", } \underline{x+3}, \ *(\underline{x+3}), \ *(x+2)+3);$

- | | | | |
|-----------------------|---------|---------|----------|
| A) $2036, 2036, 2036$ | Add | $x[3]$ | $x[2]+3$ |
| B) $2012, 4, 2024$ | Address | Add + 3 | |
| C) $2036, 10, 10$ | | Add | |
| D) $2012, 4, 6$ | | | |

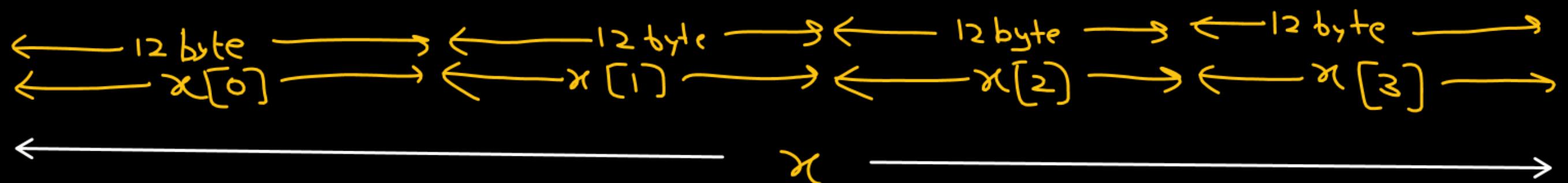
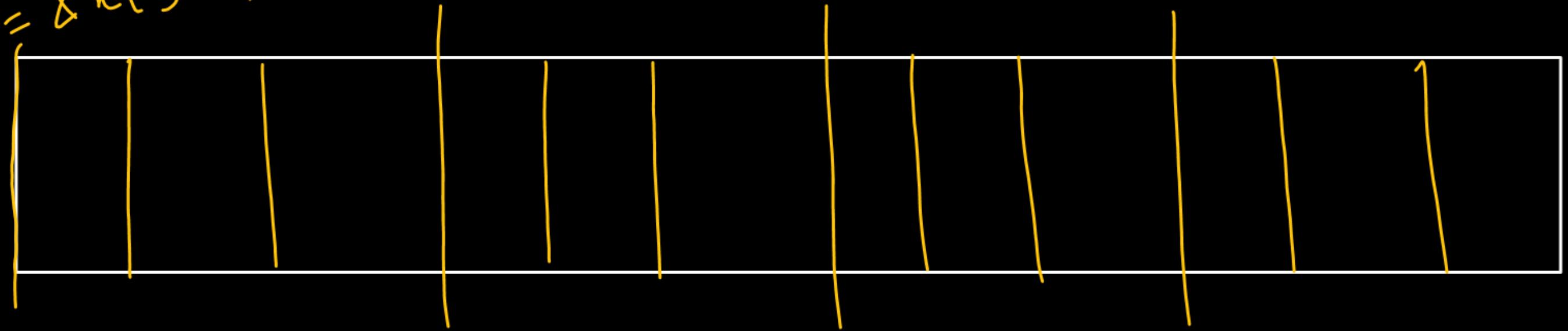
$x \rightarrow 2000$ int \rightarrow 4 byte

\backslash
Gate - 2015

unsigned int $x[4][3] = \{ \{1,2,3\}, \{4,5,6\}, \{7,8,9\}, \{10,11,12\} \};$

`printf(" %u %u %u", $x+3$, *($x+3$), *($x+2$)+3);`

$x+3$
 \downarrow
 $\&x[0]+3$ $= 8x[0]+3 \times 12 = 2036$



$x \rightarrow 2000$ int $\rightarrow 4$ byte

\searrow
Gate - 2015

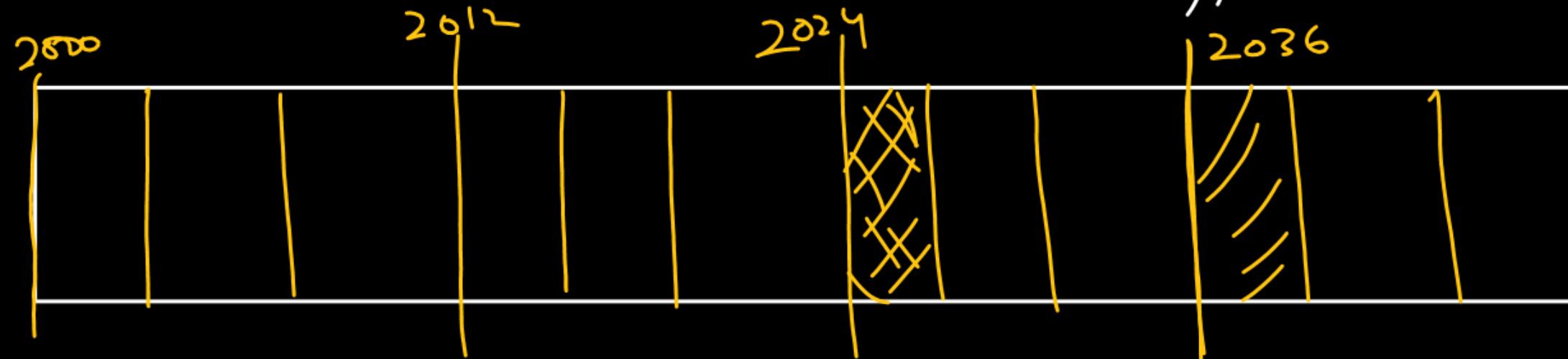
unsigned int $x[4][3] = \{ \{1, 2, 3\}, \{4, 5, 6\}, \{7, 8, 9\}, \{10, 11, 12\} \};$

`printf("%u %u %u", $x+3$, *($x+3$), *($x+2$) + 3);`

$*(\mathbf{x}+3) \Rightarrow x[3]$

$\&x[3][0]$

$= 2036$

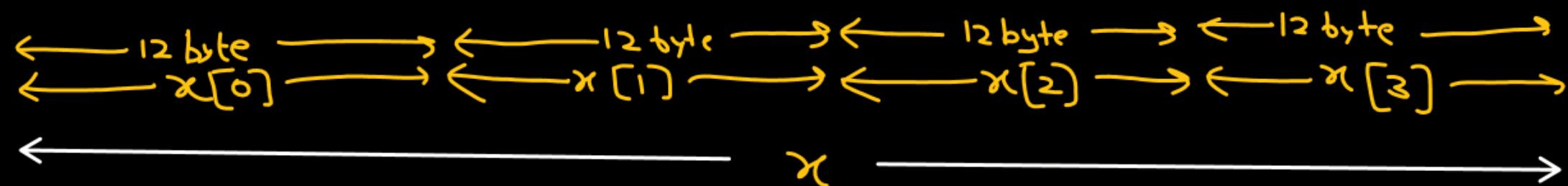


$x[2] + 3$

$\&x[2][0] + 3$

$\&x[2][0] + 3 \times 4$

$= 2024 + 12 = 2036$



BA-1000
 int - by 1c

2. int $a[2][3] = \{1, 2, 3, 4, 5, 6\};$ $\rightarrow a[0][0]$

$\text{pf}(\cdot / u \cdot / u \cdot / u, a, *a, \boxed{**a});$
 value
 $\text{pf}(\cdot / u \cdot / u \cdot / u, a+1, *a+1, \boxed{**a+1});$
 value
 $= 2$

A) 1000 1000 | 1012 1004 5 .

B) 1000 1000 1000 1012 1004 1004 X

C) 1000 1000 | 1012 1008 5

D) None ✓

$p \rightarrow$ Pointer

$p+1$ ✓

$p+3$ ✓

$p-1$ ✓

$p-3$ ✓

$p++$ ✓

$++p$ ✓

$--p$ ✓

$p--$ ✓

Pointer

(i) Can we subtract 2 pointers.

valid if some ele. of

p → Array

q → another element
of same array

A - 106
K.N - Delhi

A - 104
K.N - Mathura

A -104

K.N - Mathura

A -106

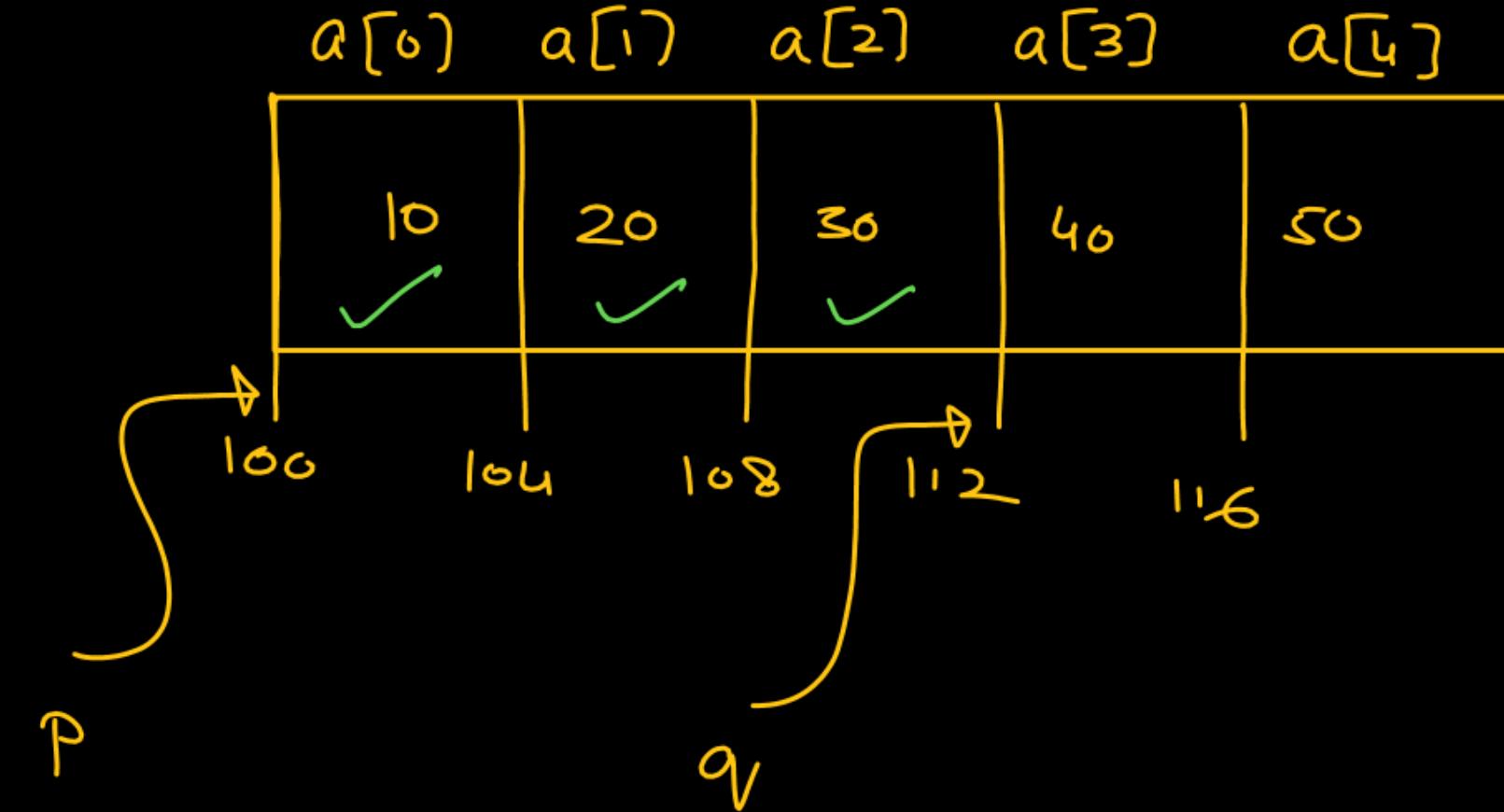
K.N Mathura

```

int *P;
int *q;
P = &a[0];
q = &a[3];

```

bf("./d", q - P);



$$q - P = 112 - 100 = \frac{12}{4} = 3$$

Q3

int a[4] = {10, 20, 30, 40};

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

int y;

$y = \underline{\underline{-P[0]}} - P[1];$ $\rightarrow (i) P[0] = P[0] - 1$

o printf("./d", y);

printf("./d", *P[0]); 30

A) 020

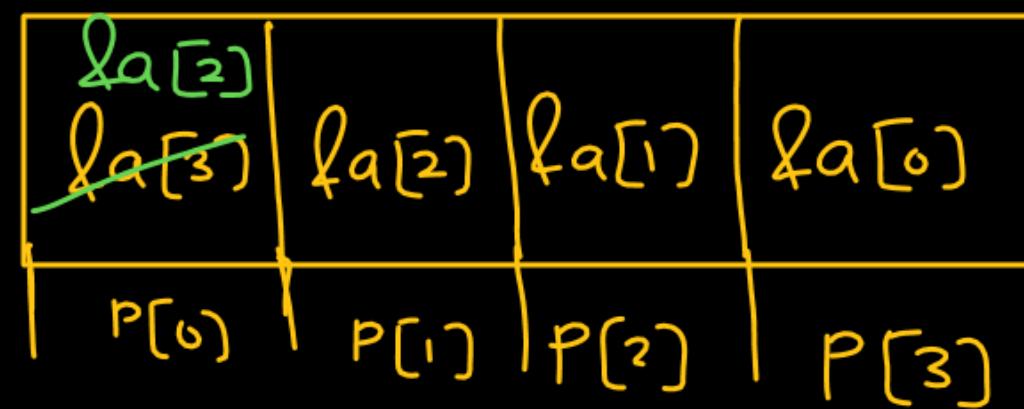
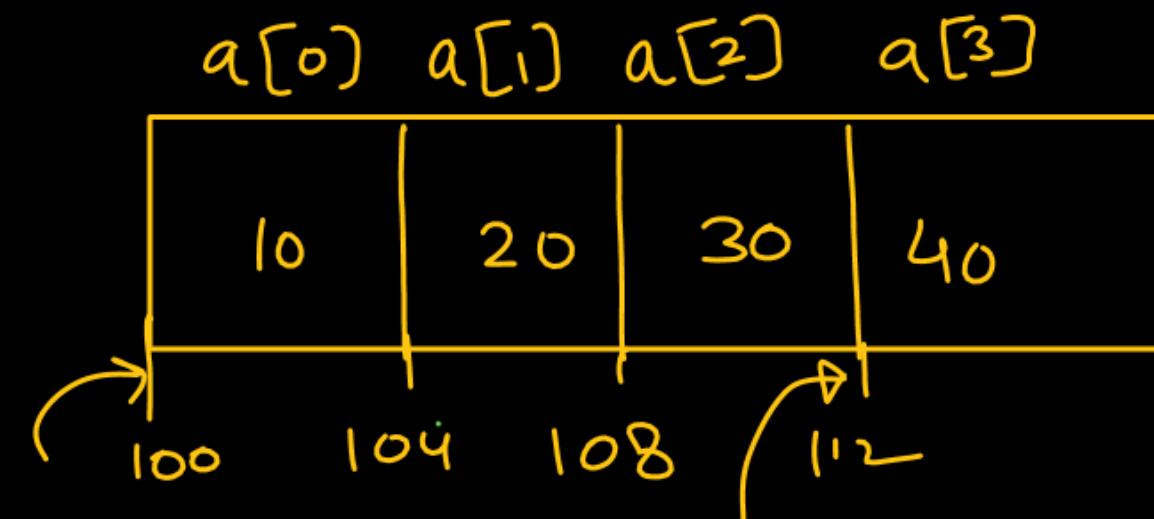
B) 010

C) 130

D) 030

$*P[0]$
~~+fa[2]~~

$a[2]$



$$P[0] = \underline{\underline{fa[3]}} - 1 \\ = \underline{\underline{fa[2]}}$$

$$y = \frac{fa[2] - fa[2]}{4} = \frac{0}{4} = 0$$

Gate - 2005

int (*f)(int *);
↓ pointer

- ~~A) A func. that takes a int. pointer as arg & returns an integer.~~
- ~~B) A " " " " an int. as arg. & returns a int. pointer.~~
- C) A pointer to a func. that takes an int. pointer as arg. and returns an integer.
- ~~D) A func. that takes an int. pointer as arg. & returns a func. pointer.~~

Q

int a=5, b=10, c=15 ;

int *P[3] = { &a, &b, &c };

printf("%d", *P[*P[1]-8]);

1 Marks

$$P[1] = \&b$$

$$\star P[1] = \star \&b = b = 10$$

A) Segmentation fault

B) Compilation Error

C) 15

D) 10

$$\star P[1]-8 = 10-8 \\ = 2$$

$$\star P[2] = \star \&c \\ = c = 15$$

Gate-2015

```
void main() {
    static int a[] = {10, 20, 30, 40, 50};
    static int *p[] = {a, a+3, a+4, a+1, a+2};
```

```
int **ptr = p;    ptr = &p[0];
```

$\text{ptr}++;$

$\text{printf("d d", } \overset{①}{\text{*}} \text{ptr - p, } \overset{40}{\text{*}} \text{ptr);}$

~~$\text{*} \text{*} \text{ptr}$~~
 ~~$\text{*} \text{*} \&\text{p[1]}$~~

$\&\text{p[1]} - \&\text{p[0]}$

Actual diff

$\&\text{p[1]}$

~~$\&\text{a[3]}$~~

$a[3] = 40 = \textcircled{1}$

$a[0]$	$a[1]$	$a[2]$	$a[3]$	$a[4]$
10	20	30	40	50

P
 $\&\text{p[0]}$

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

ptr
 $\&\text{p[0]} \&\text{p[1]}$

Gate 2003

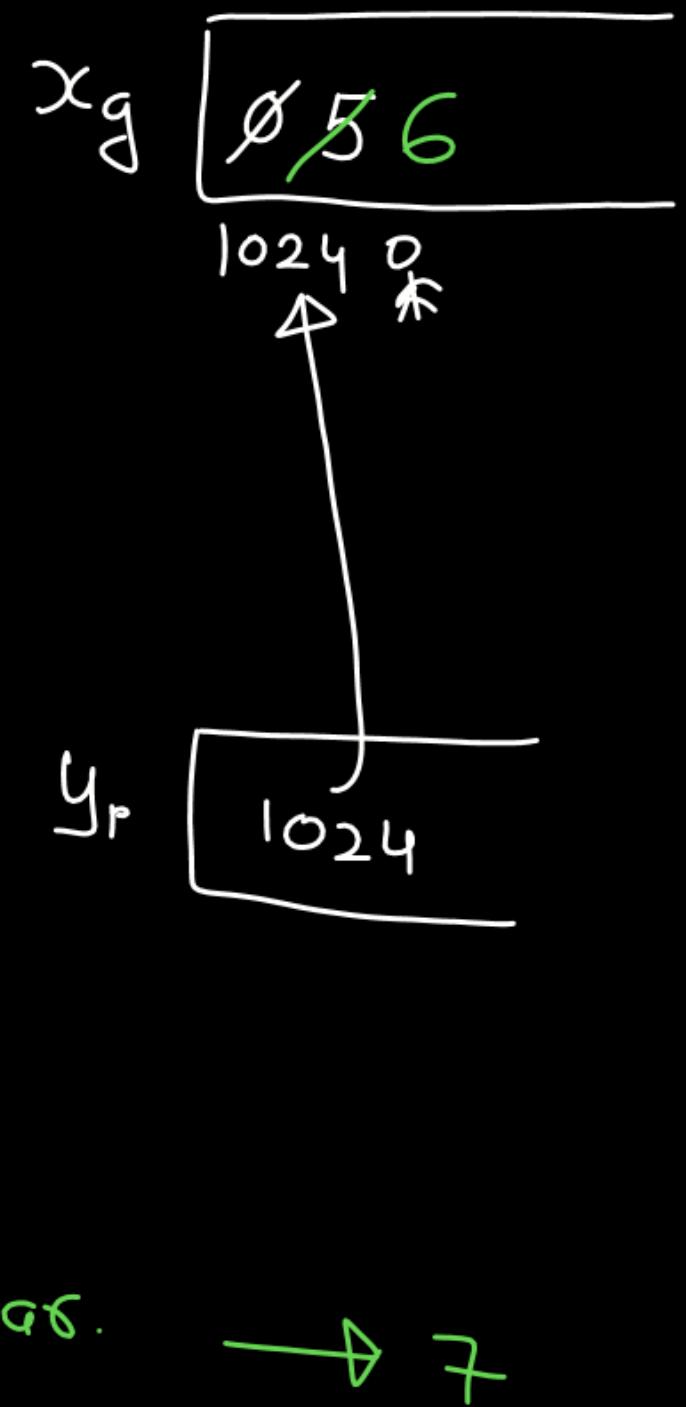
```
#define print(x) printf("%d", x);  
  
int x;  
  
void Q(int z){ z = z + x;  
    print(z);  
}  
  
void P(int *y){ int x = *y + 2;  
    Q(x);  
    *y = x - 1;  
    print(x);  
}  
  
void main(){  
    x = 5;  
    P(&x);  
    print(x);  
}
```

11:00 AM }
05:00 PM }
08:30 PM }

A]	12	7	6
B]	22	12	11
C]	14	6	6
D]	7	6	6

Gate 2003

```
#define print(x) printf("%d", x);  
  
int x;  
void Q(int z){    z = z + x;    → global  
    print(z);  
}  
  
void P(int *y){    int x = *y + 2;    ← 5 + 2  
    Q(x);  
    *y = x - 1;    ←  
    print(x); // local var.  
}  
  
void main(){    x = 5;  
    P(&x);  
    print(x);    ←  
}
```



12 7 6
 $P(1024)$
 $Q(7)$

Gate 2003

```
#define print(x) printf("%d",x);  
  
int x;  
void Q(int z){ z=z+x;  
    print(z);  
}  
  
void P(int *y){ int x=*y+2;  
    Q(x);  
    *y=x-1;  
    print(x);  
}  
  
void main(){  
    x=5;  
    P(&x);  
    print(x);  
}
```

Pre-process

```
int x;  
void Q(int z){ z=z+x;  
    printf("%d",z);  
}  
  
void P(int *y){  
    int x=*y+2  
    Q(x)  
    *y=x-1;  
    printf("%d",x);  
}  
  
void main(){  
    x=5;  
    P(&x);  
    printf("%d",x);  
}
```

Gate 2003

int *A[10];

int B[10][10];

A[2] = & —
1,2

of the following exp which will not give C.T.E if

used as Lvalue of an assignment statement

(1) A[2]

(2) A[2][2]

(3) B[1]

(4) B[2][3]

A) 1, 2 and 4

B) 2, 3 and 4

C) 2 and 4

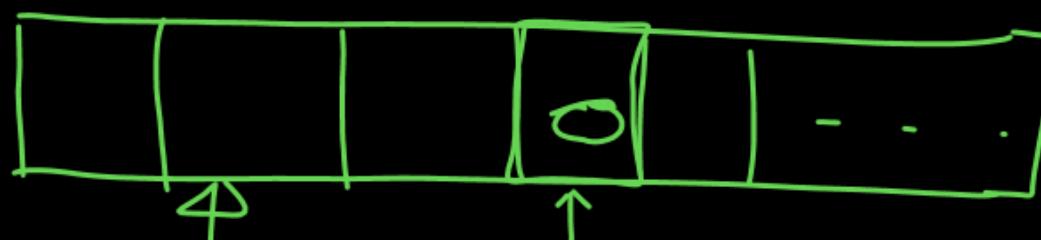
D) 4 only

Gate 2003

```
int *A[10];
```

```
int B[10][10];
```

$$A[2] = \& - 1,2$$



(✓) A[2]

(3) $A[2][2]$

(3) $B\Gamma_1$

~~(4)~~ B[2][3]

A



$A[0]$ $A[1]$ $A[2]$

$$T(A[2] + 2)$$

$$A(-z)z$$

Gate 2020

int $a[4][5] = \{ \{ \textcircled{1}, 2, 3, 4, 5 \},$
 $\{ 6, 7, 8, 9, 10 \},$
 $\{ 11, 12, 13, 14, 15 \},$
 $\{ 16, 17, 18, \textcircled{19}, 20 \}$
};

11 AM

pf ("./d\n", *(*(*(* $a + \overset{a+1+2}{\star} a + 2) + 3)) ;$

(19)

$a[3][3] \leftarrow \overset{\star}{\star}(a[3] + 3)$

