GATE PSUs
State Engg. Exams

MADE EASY Workbook 2025

Detailed Explanations of Try Yourself *Questions*

Computer Science & IT
Programming
and Data Structures

MADE EASY PUBLICATIONS

1 Programming

Detailed Explanation of Try Yourself Questions

T1 : Solution

[O(n^2)]

A(n)

```
{     for (i = 1 to n)
      {     if (n mod i = = 0)
            {     for (j = 1 to n)
                  printf(j)
            }
      }
}
```

The inner `if` block = O(n/2) = O(n); the outer `for` block = O(n).

Time complexity = O(n) × O(n) = O(n^2)

T2 : Solution

[O(1)]

```
main( )
{     int i = 3;
      switch (i)
      {     default : printf("zero")
            Case 1 : printf("one")
                  break
            Case 2 : printf("two")
                  break
            Case 3 : printf("three")
                  break
      }
}
```

Since i = 3 so switch (3) will go to case 3 and run the program only one time.

So time complexity = O(1).

T3 : Solution

1. Const int *P;
   declare P as pointer to const integer.
2. int * const P;
   declare P as constant pointer to integer

T4 : Solution

(*i*) Char (*(*x ( ))[ ])();
declare x as a function returning pointer to array of pointer to function returning char.

(*ii*) Char (*(*x[3])( ) [5];
declare x as array 3 of pointer to function returning pointer to array 5 of char.

(*iii*) Void (*b*int, void (*f)(int))) (int);
Syntac error

(*iv*) Void (*ptr)(int (*)[2], int(*)(void));
Syntax error

T5 : Solution

(b)

Char \ 0
if (0) ∵∵∵ Printf(% S", a) = Null = 0
So condition false
So answer is else part string is not empty.

T6 : Solution

(a)

Since variable d of integer type is static so memory is allocated to it compile time only and same memory is used every time. Therefore, every time old value of *d* (which is update in previous iteration) is used.

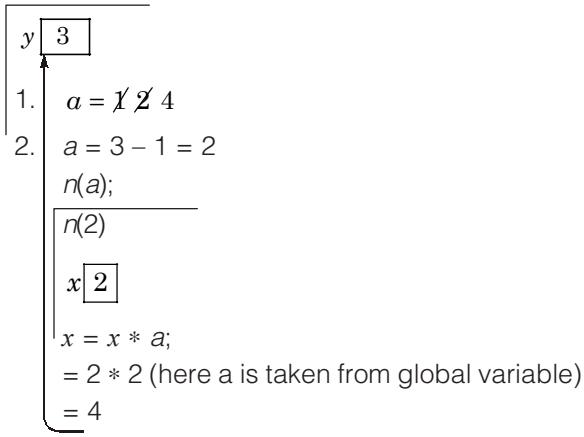
So, output is 312213444.

T7 : Solution

(d)

a 31 globally initialize.

1. $m(3)$



Printf(4); = 4

3. Printf(a) = 4 since dynamic scoping is used. So, take value of inner variable 'a'.
So answer will be 4, 4.

T8 : Solution

(c)

Take random value of X and Y i.e., $X = 5$ and $Y = 3$.

Initially $X = 5$, $Y = 3$, res = 1, $a = X$ and $b = Y$

Option (a): $X^Y = a^b$

$X^Y = a^b \equiv 5^3 = 5^3 \equiv 125 = 125$

After iteration 1

res = 5; a = 5; b = 2; X = 5; Y = 3

$X^Y = a^b \equiv 5^3 \neq 5^2 \equiv 125 \neq 25$

So, case fail. Option (a) cannot be answer.

Option (b): $(\text{res} * a)^Y = (\text{res} * X)^b$

$(1 \times 5)^3 = (1 \times 5)^3 \equiv 125 = 125$

After iteration 1

res = 5; $a = 5$; $b = 2$; $X = 5$; $Y = 3$

$(\text{res} * a)^Y = (\text{res} * X)^b \equiv (5 \times 5)^3 = (5 \times 5)^2$

$15625 \neq 625$ So, case fail. Option (b) cannot be answer.

Option (d): $X^Y = (\text{res} * a)^b$

$5^3 = (1 \times 5)^3 \equiv 125 = 125$

After iteration 1

res = 5; $a = 5$; $b = 2$; $X = 5$; $Y = 3$

$X^Y = (\text{res} * a)^b \equiv 5^3 = (5 \times 5)^2$

$125 \neq 625$ So, case fail.

Option (d) cannot be answer.

Option (c):

$X^Y = \text{res} * a^b$

$5^3 = 1 \times 5^3 \equiv 125 = 125$

After iteration 1

$\text{res} = 5;\ a = 5;\ b = 2;\ X = 5;\ Y = 3$

$X^Y = \text{res} * a^b \equiv 5^3 = 5 \times 5^2 \equiv 125 = 125$

After iteration 2

$\text{res} = 25;\ a = 5;\ b = 1;\ X = 5;\ Y = 3$

$X^Y = \text{res} * a^b \equiv 5^3 = 25 \times 5^1 \equiv 125 = 125$

So, all cases are passes.

So option (c) will the answer.

T9 : Solution

a	3	5	2	6	4

1. $f(a, 5)$ is a function contain 2 parameter one contain starting address of array and second parameter tell number of element in the array.
2. Every time 'n' value compare with 1 when it is less than equal to 1 return 0 and stop the program otherwise continue with recursive function call.

1. $f(a, 5)$
   $*P = a$; P pointed to same address pointed by 'a'.
   $n = 5$; n value greater than 1.
   So, max ($f(P + 1, 5 - 1), 3 - 5$); or
   max ($f(P + 1, 4) - 2$);
2. $f(P + 1, 4)$
   $*P = P + 1$; P is pointed to next element of array i.e., 5.
   $n = 4$; n value greater than 1.
   So, max (max($f(P + 1, 4 - 1), 5 - 2), -2$) or
   max (max($f(P + 1)$ 3), 3), –2)
3. $f(P + 1, 3)$
   $*P = P + 1$; P is pointed to next element of array i.e., 2.
   $n = 3$; n value greater than 1.
   So, max(max(max($f(P + 1, 3 - 1), 2 - 6), 3) -2$) or max(max(max($f(P + 1, 2), - 4), 3) -2$);
4. $f(P + 1, 2)$;
   $*P = P + 1$; P is pointed to next element of array i.e., 6.
   $n = 2$; n value greater than 1.
   So, max(max(max(max($f(P+ 1, 2 - 1), 2),-4), 3), -2$) or
   max(max(max(max($f(P+1, 1), 2), -4), 3),-2$)
5. $f(P + 1, 1)$;
   $*P = P+1$; P is pointed to next element of array i.e., 4.
   $n = 1$; n value equal to 1 so, return 0.
   So max(max(max(max(0, 2), –4), 3), –2)
   max(max(max(2, –4), 3), –2)
   max(max(2, 3), –2)
   max(3, –2) = 3

So the value printed by given code is 3.

■■■■

2 Linked List, Stack, Queue and Hashing

T1 : Solution

Implementation of stack using single link list:

Inserting sequence: 1, 2, 3, 4, 5, 6

Insertion take 0(1) time

Link list representation:

1. → [1 | /]
2. → [2 |] → [1 | /]
3. → [3 |] → [2 |] → [1 | /]
4.
5.
6. Insertion takes 0(1) time.

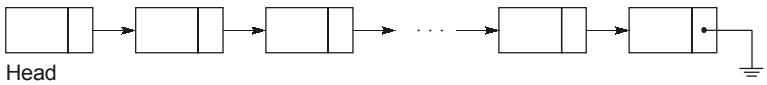
Deletion in stack (Pop)

Remove top element every time so 0(1)

Deletion in link list

Remove 1st node every time with making second node to head.

T2 : Solution



enqueue operation takes $O(1)$ time

dequeue operation takes $O(n)$ time [visits last node]

T3 : Solution

(d)

PUSH (S, P, Q, T_i, x)
{
    if $\left(T_i == \left(\frac{P}{Q} \times (i+1) - 1\right)\right)$
    {
        printf ("stack overflow");
        exit (1);
    }
    else
        T_i++;
    $S[T_i] = x$;
}

$T_i == \left(\frac{P}{Q} \times (i+1) - 1\right)$ indicate the last location of the array is already filled. So overflow occur.

T4 : Solution

(a)

Number of push operations = n(insert) + m(delete) = $n + m$

So, $n + m \le x$ but there are maximum $2n$ insert operations so $n + m \le x \le 2n$ ...(1)

Number of pop operations = $n + m$

But there are 2m delete operations which are less than no. of pop operations, hence

$$2m \le n + m \quad \text{...(2)}$$

From (1) and (2): $n + m \le x \le 2n$ and $2m \le n + m$

T5 : Solution

(22079)

Formula to find location of $a[20][20][30] = 10 + \{[(20-1)(30-1)(40-1)] + (20-1)(30-1) + (30-1)\}$

$= [10 + (19 \times 29 \times 39) + (19 \times 29) + (29)]$

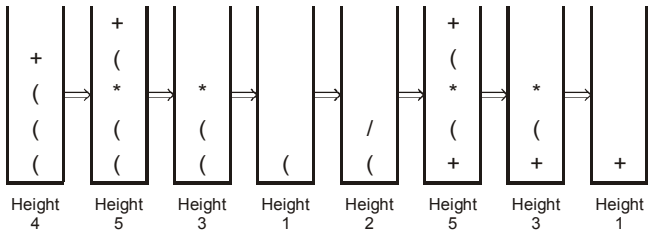
$= 10 + 21489 + 551 + 29$

$= 10 + 22069$

$= 22079$

T6 : Solution

(5)



(Uniqueue heights are 1, 2, 3, 4, 5) where 1, 3, 5 are repeated two times each. Maximum size of stack is 5.

T7 : Solution

(0.7324)

Expected number of probes in a unsuccessful = $\frac{1}{(1-\alpha)}$

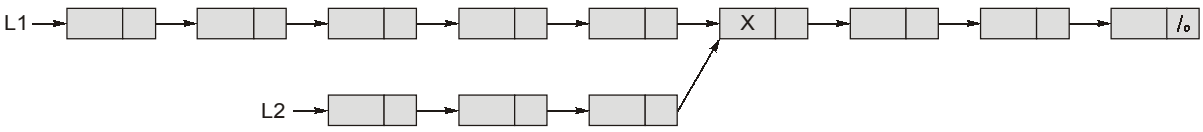
$$\frac{1}{1-\alpha} = 3$$
$$1 = 3(1-\alpha)$$
$$1 = 3 - 3\alpha$$
$$-2 = -3\alpha$$
$$\alpha = \frac{2}{3}$$

Expected number of probes in a unsuccessful = $1/\alpha \log_e 1/(1-\alpha)$

$$\frac{3}{2}\log_e 3 = 0.7324$$

T8 : Solution

(b)



We need to traverse both the linked list of size m and n.

So it will take $O(m + n)$.

T9 : Solution

(b)

By using BSF (Breadth First Search) traversal we can set the twin pointer in each entry in each adjacency list. So it will take $\Theta(m + n)$ times (since adjacency list are using).

