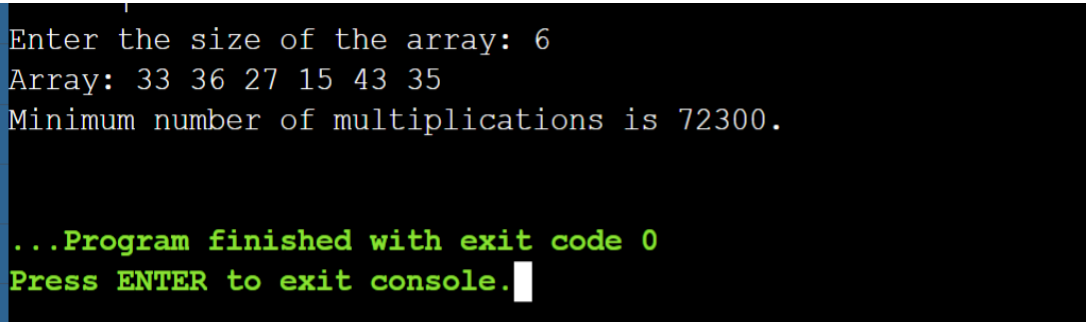
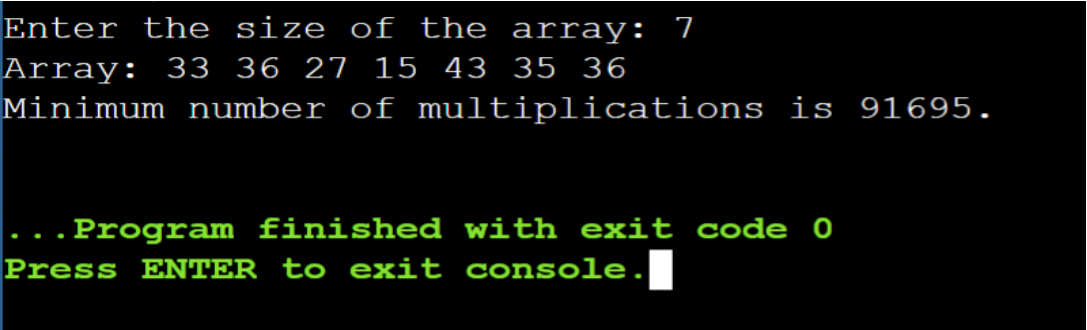


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<b>SUBJECT</b>	Design and Analysis of Algorithm
<b>EXPERIMENT NO :</b>	04
<b>DATE OF PERFORMANCE</b>	05/03/2023
<b>DATE OF SUBMISSION</b>	12/03/2023
<b>AIM:</b>	To find the minimum matrix chain multiplications required.
<b>PROBLEM STATEMENT 1:</b>	<b>Matrix chain multiplication of matrices of different order.</b>
<b>ALGORITHM and THEORY:</b>	<p>MATRIX-CHAIN-ORDER (p)</p> <ol style="list-style-type: none"> <li>1. <math>n \leftarrow \text{length}[p]-1</math></li> <li>2. for <math>i \leftarrow 1</math> to <math>n</math></li> <li>3. do <math>m[i, i] \leftarrow 0</math></li> <li>4. for <math>l \leftarrow 2</math> to <math>n</math> // <math>l</math> is the chain length</li> <li>5. do for <math>i \leftarrow 1</math> to <math>n-l+1</math></li> <li>6. do <math>j \leftarrow i+l-1</math></li> <li>7. <math>m[i, j] \leftarrow \infty</math></li> <li>8. for <math>k \leftarrow i</math> to <math>j-1</math></li> <li>9. do <math>q \leftarrow m[i, k] + m[k+1, j] + p_{i-1} p_k p_j</math></li> <li>10. If <math>q &lt; m[i, j]</math></li> <li>11. then <math>m[i, j] \leftarrow q</math></li> <li>12. <math>s[i, j] \leftarrow k</math></li> <li>13. return <math>m</math> and <math>s</math>.</li> </ol>

**PROGRAM:**

```
#include<stdio.h>
#include<math.h>
#include<limits.h>
int MCM(int a[],int i,int j)
{
    if(i==j)
    {
        return 0;
    }
    int k;
    int min=INT_MAX;
    int count;
    for(k=i;k<j;k++)
    {
        count=MCM(a,i,k)+MCM(a,k+1,j)+a[i-1]*a[k]*a[j];
        if(count<min)
        {
            min=count;
        }
    }
    return min;
}
int main()
{
    int n,i,j;
    printf("Enter the size of the array: ");
    scanf("%d",&n);
    int a[n];
    for(i=0;i<n;i++)
    {
        a[i]=rand()%50;
    }
    printf("Array: ");
    for(i=0;i<n;i++)
```

	<pre> {     printf("%d ",a[i]); } int N=sizeof(a)/sizeof(a[0]); printf("\nMinimum number of multiplications is %d.\n",MCM(a,1,n-1)); return 0; } </pre>
<b>OUTPUT:</b>	 <pre> Enter the size of the array: 6 Array: 33 36 27 15 43 35 Minimum number of multiplications is 72300.  ...Program finished with exit code 0 Press ENTER to exit console. </pre>  <pre> Enter the size of the array: 7 Array: 33 36 27 15 43 35 36 Minimum number of multiplications is 91695.  ...Program finished with exit code 0 Press ENTER to exit console. </pre>
<b>CONCLUSION:</b>	<p>By performing above experiment I have understood matrix chain multiplication and its uses thoroughly. This dynamic programming approach reduces time complexity of the matrix chain multiplication.</p>