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Example   Suppose a numeric array A having M row and N columns, and a numeric array X having N elements. Write a code Program to calculate a numeric array Y by carrying out the following operations. Print a new array Y.

$$[Y]_m = [A]_{m,n} * [X]_n$$

Solution:
```
Dim M, N
M=Val (Text1.Text)   : N= Val (Text2.Text)
ReDim A (M, N), X(N), Y(M)
For I=1 To M
For J=1 To N
A(I,J) = Val (InputBox(""))
Picture1.Print A(I, J);
Next J: Picture1.Print: Next I
For I=1 To N
X(I)=Val (Inputbox(""))
Picture2.Print X(I)
Next I
For I=1 To M
For J=1 To N
Y(I)=Y(I)+A(I,J)*X(J)
Next J, I
For I=1 To M
Picture3.Print Y(I)
Next I
```
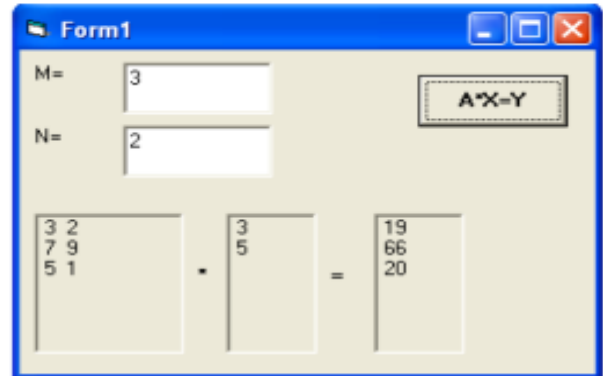
Note: Each element of Y is determined from the following formula:

Y (**1**) = A(**1**, 1)*X(1)+A(**1**, 2)*X(2)
Y (**2**) = A(**2**, 1)*X(1)+ A(**2**, 2)*X(2)
Y (**3**) = A(**3**, 1)*X(1)+A(**3**, 2)*X(2)

Example   Suppose a numeric array (A) having (5 row and 3 columns), and that (B) is a numeric array having (3 rows and 5 columns). Write a code Program to calculate the elements of the numeric array C, where a numeric array C is determined from the following formula:

[C]   = [A]   * [B]   . Print a numeric array C.

Solution: Each element of array C is determined by $[C]_{m,n} = [A]_{m,k} * [B]_{k,n}$

```
Dim A(5,3) , B(3,4), C(5,4)
For I=1 To 5
For J=1 To 3
A(I,J)=Val(InputBox("A"))
Next J , I
For I=1 To 3
```

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```
For J=1 To 4
B(I,J)=Val(InputBox("B"))
Next J , I
For I=1 To 5
For J=1 To 4
For K=1 To 3
C(I,J)=C(I,J) + A( I,K ) * B( K,J )
Next K, J, I
For I=1 To 5
For J=1 To 4
Picture1.Print C(I,J);
Next J: Picture1.Print: Next I
```

Note: Each element of C is determined from the following formula:

$C(1,1)= A(1,1)*B(1,1)+ A(1,2)*B(2,1) +A(1,3)*B(3,1)$

$C(2,2)=A(2,1)*B(1,2)+ A(2,2)*B(2,2)+ A(2,3)*B(3,2)$

Example — Suppose a numeric array (A) having M elements. Write a code Program to calculate the elements of the numeric array C, where a numeric array C is determined from the following formula: $[C] = [A] * [A]^T$. Print a numeric array C.

Example — Suppose a numeric array (A) having M elements. Write a code Program to calculate the elements of the numeric array C, where a numeric array C is determined from the following formula: $[C] = [A] * [A]^T$. Print a numeric array C.
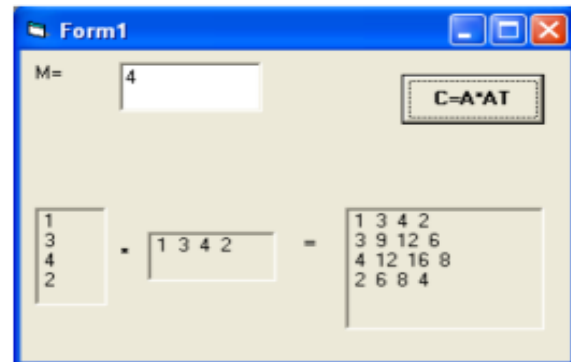
Solution: Where $B=A^T$

```
Dim M As Single
M=Val(Text1.text)
ReDim A(M),B(1,M), C(M,M)
For I=1 To M
A(I) =Val (InputBox(""))
B(1,I)=A(I)
Picture1.Print A(I)
Picture2.Print A(I);
Next I
For I= 1 To M
For J=1 To M
C(I,J)= C(I,J) +A(I)*B(1,J)
Next J, I
For I=1 To M
For J=1 To M
Picture3.print C(I,J);
Next J: Picture3.Print: Next I
```

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Exercises:

1: Suppose a one dimension array A with N elements is entered into inputbox. Write a visual basic program segment which is calculated the product: $Prod = \prod_{i=1}^{N}(1 - A_i)$

2: Consider a sequence of real numbers, X_i, i= 1,2,...., M. the mean is defined as:

$\bar{X} = \frac{\sum_{i=1}^{m} X_i}{m}$, the standard deviation is $\sigma = \sqrt{\frac{\sum(X_i - \bar{X})^2}{m}}$

Write a code program to read in the first M elements of a one dimension array. Calculate the mean and the standard deviation.

3: Write a code program that will read in a set of temperatures T(M), determine an average, and then calculate the deviation of each temperature about the average D(M). The deviation is defined as D(I)=T (I)- A

Where, A represents the average temperature. Print out the average temperature, followed by three columns containing the values for I, T (I) and D(I), respectively.

4: To compute the area under the curve for the function $f(x) = 3x^3 - 4x^2 + 6x + 5$ in an interval $(a \leq x \leq b)$ is equal to $\int_a^b f(x)dx$. Write a code program to reads a, b and N (where N is a number of segments) respectively. Calculate the numerical array F(N) and the approximate area by the Trapezoid rule from the following formula. Display the approximate area into separate text box.

$$area \approx \frac{1}{2}h\left[f(a) + f(b) + 2\sum_{i=1}^{N-1} f(x_i)\right]$$

Where: $h = \frac{b-a}{N}$: $x_i = a + h.i$

And F(0)=F(a): F(N)=F(b)

5: Suppose a numeric array S(10,3). Write a code program to read the elements of the array S (three positive integers a, b, c) for each Pythagorean triplet. Calculate the area for all Pythagorean triplets and stored into a numeric one dimension array (Area), where a form a Pythagorean triplet if $a^2 + b^2 = c^2$. Print the arrays S and Area.