Solution

1. calculate the volume of cubes with side lengths [2.1 3.3 4] cm

```
>> cubes=[2.1 3.3 4]

cubes =
    2.1000    3.3000    4.0000

>> cubes.^3

ans =
    9.2610   35.9370   64.0000
```

Solution

2. calculate the functional values of $y = cos(x)$ for x in points $0, \pi/4, \pi/2, \ldots, 2\pi$ and in the vector y change the sign for the element, which are less than zero

```
>> x=0:pi/4:2*pi

x =
         0    0.7854    1.5708    2.3562    3.1416    3.9270    4.7124    5.4978    6.2832

>> y=cos(x)

y =
    1.0000    0.7071    0.0000   -0.7071   -1.0000   -0.7071   -0.0000    0.7071    1.0000

>> ind=find(y<0)

ind =
     4     5     6     7

>> y(ind)=-y(ind)

y =
    1.0000    0.7071    0.0000    0.7071    1.0000    0.7071    0.0000    0.7071    1.0000
```

Solution

3. create vector of numbers $< -1, 2 >$ containing 15 elements and remove the negative elements from the vector

```
>> c=linspace(-1,2,15)

c =

  Columns 1 through 14

   -1.0000   -0.7857   -0.5714   -0.3571   -0.1429    0.0714    0.2857    0.5000   ...
      0.7143    0.9286    1.1429    1.3571    1.5714    1.7857

  Column 15

    2.0000

>> c(c>0)

ans =

    0.0714    0.2857    0.5000    0.7143    0.9286    1.1429    1.3571    1.5714   ...
      1.7857    2.0000
```

Solution

4. generate 3×5 matrix of $N(0,1)$ random numbers, find the position (row,column) of maximum value and increase the value 10 times

```
>> M=randn(3,5)

M =
   -1.3077    3.5784    3.0349    0.7147    1.4897
   -0.4336    2.7694    0.7254   -0.2050    1.4090
    0.3426   -1.3499   -0.0631   -0.1241    1.4172

>> m=max(M(:))

m =
    3.5784

>> [r s]=find(M==m)

r = 1

s = 2

>> M(r,s)=M(r,s)*10

M =
   -1.3077   35.7840    3.0349    0.7147    1.4897
   -0.4336    2.7694    0.7254   -0.2050    1.4090
    0.3426   -1.3499   -0.0631   -0.1241    1.4172
```

Solution

5. for a vector t (t=1:0.2:2), write down the MATLAB expression that will compute:

   - $\ln(2 + t + t^2)$,
   - $\cos(t)^2$ - $\sin(t)^2$.
   - $e^t(1+\cos(3t))$,
   - $\tan^{-1}(t)$.

```
>> t=1:0.2:2;

>> log(2+t+t.^2)
ans =
    1.3863    1.5347    1.6790    1.8181    1.9516    2.0794

>> cos(t.^2)-sin(t.^2)
ans =
   -0.3012   -0.8610   -1.3047   -1.3849   -0.8969    0.1032

   >> t=1:0.2:2;

>> exp(t).*(1+cos(3*t))
ans =
    0.0272    0.3428    2.0671    5.3864    9.8893   14.4838

>> atan(t)
ans =
    0.7854    0.8761    0.9505    1.0122    1.0637    1.1071
```

Solution

6. for given matrices solve following equations:

$$A = \begin{pmatrix} 1 & 0 & -1 \\ 2 & 1 & 1 \end{pmatrix} \quad B = \begin{pmatrix} 2 & -2 & 1 \\ 0 & 1 & 2 \end{pmatrix} \quad C = \begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 0 & 0 \end{pmatrix}$$

- $A + X_1 = B$,
- $(A - X_2)C = B$.

```
>> A=[1 0 -1;2 1 1];
>> B=[2 -2 1;0 1 2];
>> C=[1 0 1;0 1 1;1 0 0];

>> X1=B-A % to express unknown X1
X1 =
     1    -2     2
    -2     0     1

>> X2=A-B/C % to express unknown X2
X2 =
    -2     2     0
     1     0     2
```

Solution

7. Create an integer random 5×6 matrix A with elements from interval [-7,7] and compute the sum of its line maxims.

```
A = round(14 * rand(5, 6) - 7)

A =

     4    -6    -5    -5     2     4
     6    -3     7    -1    -7     3
    -5     1     6     6     5    -2
     6     6     0     4     6     2
     2     7     4     6     3    -5

>> sum(max(A'))
ans =
    30
```