```
ln[\circ]:= f = \{3, 5\}; d = \{-2, 1\};
             wd = Dot[f, d]
   Out[•]= - 1
    In[*]:= Print["work done = ", wd]
             work done = -1
    In[*]:= theta = ArcCos[wd/(Norm[f] * Norm[d])] // N
             Print["Anlge =", theta * 180 / Pi]
   Out[*]= 1.64757
             Anlge =94.3987
    ln[*]:= M = \{\{1, 0, 0\}, \{0, 1, 0\}, \{0, 0, 1\}\}
             n = \{\{0, -1, 0\}, \{0, 0, -1\}, \{1, 0, 0\}\}
   Out[*]= \{ \{1, 0, 0\}, \{0, 1, 0\}, \{0, 0, 1\} \}
   \textit{Out[} \, \text{\tiny o} \, \text{\tiny j=} \, \left\{ \, \left\{ \, \textbf{0,} \, \, -1, \, \, \textbf{0} \, \right\} \, , \, \, \left\{ \, \textbf{0,} \, \, \textbf{0,} \, \, -1 \, \right\} \, , \, \, \left\{ \, \textbf{1,} \, \, \textbf{0,} \, \, \textbf{0} \, \right\} \, \right\}
    In[@]:= 2 m - 3 n // MatrixForm
Out[ • ]//MatrixForm=
                 2 3 0
                 0 2 3
    In[ - ]:= mm = m.n
   \textit{Out[} \, {}_{^{0}}\textit{]}\text{= } \, \left\{ \, \left\{ \, \textbf{0, -1, 0} \, \right\} \, , \, \, \left\{ \, \textbf{0, 0, -1} \, \right\} \, , \, \, \left\{ \, \textbf{1, 0, 0} \, \right\} \, \right\}
    In[@]:= mm // MatrixForm
Out[ • ]//MatrixForm=
                0 0 -1
              (*Clearing*)
    In[ \circ ] := f = . ;
```

```
ln[*]:= f[i_, j_] := 1/(i+j+1);
        Array[f, {2, 2}] // MatrixForm
        matrix = Table[f[i, j], \{i, 1, 2\}, \{j, 1, 2\}]
        matrix // N
        m1 = Table[a[i, j], {i, 1, 2}, {j, 1, 4}] // MatrixForm
Out[ • ]//MatrixForm=
          3
1
 Out[*]= \left\{ \left\{ \frac{1}{3}, \frac{1}{4} \right\}, \left\{ \frac{1}{4}, \frac{1}{5} \right\} \right\}
  Out[\circ] = \{ \{0.3333333, 0.25\}, \{0.25, 0.2\} \}
Out[ • ]//MatrixForm=
          a[1, 1] a[1, 2] a[1, 3] a[1, 4]
         \a[2, 1] a[2, 2] a[2, 3] a[2, 4]
  ln[*]:= m1 /. a[i_, j_] \rightarrow (i^2 + j^2 + 1)
Out[ • ]//MatrixForm=
          3 6 11 18
         6 9 14 21
  In[*]:= ? IdentityMatrix
          Symbol
                                                              0
  Out[ • ]=
           IdentityMatrix[n] gives the n \times n identity matrix.
  Info ]:= IdentityMatrix[3] // MatrixForm
Out[ • ]//MatrixForm=
           1 0 0
           0 1 0
           0 0 1
  In[*]:= Table[KroneckerDelta[i, j], {i, 1, 3}, {j, 1, 3}]
  Out[*]= \{ \{1, 0, 0\}, \{0, 1, 0\}, \{0, 0, 1\} \}
  ln[*]:= Table[If[i = j, 1, 0], \{i, 1, 3\}, \{j, 1, 3\}]
  Out[\ \ \ ]=\ \{\{1,0,0\},\{0,1,0\},\{0,0,1\}\}
         (*Rows and Columns Count*)
  In[ • ]:= m1 = . ;
        m1 = \{\{1, 1, 1\}, \{2, 2, 2\}, \{3, 3, 3\}, \{4, 4, 4\}\};
        norows = Length[m1]
        nocol = Length[m1[[1]]]
  Out[ • ]= 4
  Out[•]= 3
```

Inf("):= If[norows == nocol, Print["square matrix"], Print["Rectangular matrix"]]

Rectangular matrix

$$m2 = \{\{1, 2, 3\}, \{7, 8, 10\}, \{20, 19, 1\}\};$$

ln[-]:= If[Length[m2] == Length[m2[[1]]] &&

Det[m2] # 0, Print["it is not singular matrix and its inverse is"]; inv = Inverse[m2], Print["singular"]]

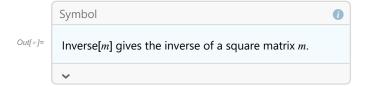
it is not singular matrix and its inverse is

$$\textit{Out[*]$} = \Big\{ \Big\{ -\frac{182}{123}, \, \frac{55}{123}, \, -\frac{4}{123} \Big\}, \, \Big\{ \frac{193}{123}, \, -\frac{59}{123}, \, \frac{11}{123} \Big\}, \, \Big\{ -\frac{9}{41}, \, \frac{7}{41}, \, -\frac{2}{41} \Big\} \Big\}$$

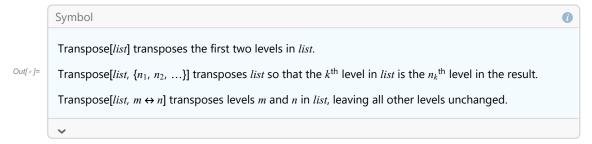
In[•]:= ? Det



In[*]:= ? Inverse



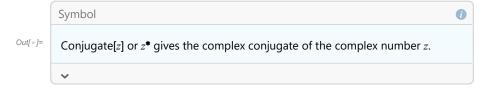
In[•]:= ? Transpose



In[*]:= Transpose[inv]

$$\textit{Out[*]$=$} \left\{ \left\{ -\frac{182}{123},\, \frac{193}{123},\, -\frac{9}{41} \right\},\, \left\{ \frac{55}{123},\, -\frac{59}{123},\, \frac{7}{41} \right\},\, \left\{ -\frac{4}{123},\, \frac{11}{123},\, -\frac{2}{41} \right\} \right\}$$

In[*]:= ? Conjugate



```
In[*]:= Conjugate[inv]
Out[*]= \left\{ \left\{ -\frac{182}{123}, \frac{55}{123}, -\frac{4}{123} \right\}, \left\{ \frac{193}{123}, -\frac{59}{123}, \frac{11}{123} \right\}, \left\{ -\frac{9}{41}, \frac{7}{41}, -\frac{2}{41} \right\} \right\}
ln[-]:= mmm = \{\{1+I, I, 2\}, \{I, 2I, 6\}, \{2, 3, I\}\}
       Conjugate[mmm]
Out[\sigma]= { {1 + \dot{1}, \dot{1}, 2}, {\dot{1}, 2\dot{1}, 6}, {2, 3, \dot{1}}
Out[\sigma]= { {1 - \dot{\mathbf{1}}, -\dot{\mathbf{1}}, 2}, {-\dot{\mathbf{1}}, -2\dot{\mathbf{1}}, 6}, {2, 3, -\dot{\mathbf{1}}}
In[*]:= If[mmm == Transpose[mmm], Print["symetric"], Print["not symetric"]]
       not symetric
Inf(mmm == Transpose[Conjugate[mmm]], Print["Hermition"], Print["not Hermition"]]
       not Hermition
In[@]:= If[mmm == -Transpose[mmm], Print["skew symetric"], Print["not skew symetric"]]
       not skew symetric
In[@]:= If[mmm == -Transpose[Conjugate[mmm]],
         Print["Skew Hermition"], Print["Not Skew Hermition"]]
       Not Skew Hermition
       (* Do more about Hermition, Symmetric, Skew Symmetric,
```

Not Symmetric, Not Hermition and Skew Hermition *)