```
ln[1]:= A = {\{a11, a12\}, \{a21, a22\}\};}
                                  B = \{\{b11, b12\}, \{b21, b22\}\};
                                 \rho = \{\{\rho11, \rho12\}, \{\rho21, \rho22\}\};
                                 \rho v = Flatten[\rho];
        In[5]:= A
      Out[5]= {{a11, a12}, {a21, a22}}
        In[6]:= B
      Out[6] = \{\{b11, b12\}, \{b21, b22\}\}
        In[7]:= P
      Out[7]= \{\{\rho 11, \rho 12\}, \{\rho 21, \rho 22\}\}
       In[8]:= PV
      Out[8]= \{\rho11, \rho12, \rho21, \rho22\}
        In[9]:= AB = KroneckerProduct[A, Transpose[B]]
      \texttt{Out} \texttt{[9]=} \ \Big\{ \Big\{ \texttt{al1} \ \texttt{bl1}, \ \texttt{al1} \ \texttt{b21}, \ \texttt{al2} \ \texttt{b11}, \ \texttt{al2} \ \texttt{b21} \Big\}, \ \Big\{ \texttt{al1} \ \texttt{b12}, \ \texttt{al1} \ \texttt{b22}, \ \texttt{al2} \ \texttt{b12}, \ \texttt{al2} \ \texttt{b22} \Big\}, \\ \Big\{ \texttt{al1} \ \texttt{b11}, \ \texttt{al1} \ \texttt{b21}, \ \texttt{al2} \ \texttt{b22} \Big\}, \\ \Big\{ \texttt{al1} \ \texttt{b12}, \ \texttt{al2} \ \texttt{b22}, \ \texttt{al2} \ \texttt{b12}, \ \texttt{al2} \ \texttt{b22} \Big\}, \\ \Big\{ \texttt{al1} \ \texttt{b12}, \ \texttt{al2} \ \texttt{b22}, \ \texttt{al2} \ \texttt{b22} \Big\}, \\ \Big\{ \texttt{al1} \ \texttt{b12}, \ \texttt{al2} \ \texttt{b22}, \ \texttt{al2} \ \texttt{b22} \Big\}, \\ \Big\{ \texttt{al2} \ \texttt{b22}, \ \texttt{al2} \ \texttt{b22}, \ \texttt{al2} \ \texttt{b22} \Big\}, \\ \Big\{ \texttt{al2} \ \texttt{b22}, \ \texttt{al2} \ \texttt{b22}, \ \texttt{al2} \ \texttt{b22}, \ \texttt{al2} \ \texttt{b22} \Big\}, \\ \Big\{ \texttt{al2} \ \texttt{b22}, \ \texttt{al2} \ \texttt{b22}, \ \texttt{al2} \ \texttt{b22}, \ \texttt{al2} \ \texttt{b22} \Big\}, \\ \Big\{ \texttt{al2} \ \texttt{b22}, \ \texttt{al2} \ \texttt{b22}, \ \texttt{al2} \ \texttt{b22}, \ \texttt{al2} \ \texttt{b22} \Big\}, \\ \Big\{ \texttt{al2} \ \texttt{b22}, \ \texttt{al2} \ \texttt{b22}, \ \texttt{al2} \ \texttt{b22}, \ \texttt{al2} \ \texttt{b22}, \ \texttt{al2} \ \texttt{b22} \Big\}, \\ \Big\{ \texttt{al2} \ \texttt{al2} \ \texttt{b22}, \\ \Big\{ \texttt{al2} \ \texttt{al2} \ \texttt{b22}, \\ \Big\{ \texttt{al2} \ \texttt{al2
                                       \{a21\ b11,\ a21\ b21,\ a22\ b11,\ a22\ b21\},\ \{a21\ b12,\ a21\ b22,\ a22\ b12,\ a22\ b22\}\}
    In[10]:= Flatten[A.\rho.B] // Simplify // MatrixForm
Out[10]//MatrixForm=
                                     ( a11 b11 
ho11 + a11 b21 
ho12 + a12 b11 
ho21 + a12 b21 
ho22 race
                                       a11 b12 \rho11 + a11 b22 \rho12 + a12 b12 \rho21 + a12 b22 \rho22 a21 b11 \rho11 + a21 b21 \rho12 + a22 b11 \rho21 + a22 b21 \rho22
                                       a21 b12 \rho11 + a21 b22 \rho12 + a22 b12 \rho21 + a22 b22 \rho22
    In[11]:= AB . \rhov // MatrixForm
Out[11]//MatrixForm=
                                     ^{\prime} all bll 
ho11 + all b21 
ho12 + al2 b11 
ho21 + al2 b21 
ho22 
angle
                                       all bl2 \rhol1 + all b22 \rhol2 + al2 bl2 \rho21 + al2 b22 \rho22
                                       a21 b11 \rho11 + a21 b21 \rho12 + a22 b11 \rho21 + a22 b21 \rho22
                                       a21 b12 \rho11 + a21 b22 \rho12 + a22 b12 \rho21 + a22 b22 \rho22
```