#NGroups 1

Title
Calculation

Begin Matrices;
End Matrices;

Begin Algebra;
End Algebra;

End Group;

```
#NGroups 1

TITLE: Figuring out the likelihood by hand
Calculation

!Declare matrices here
 Begin Matrices;              ! After MATRIX letter, specify type of matrix i.e. FULL or SYMMETRIC and DIMENSIONS.
 E                            ! Expected Covariance Matrix
 H                            !
 T                            !
 M                            ! Mean vector
 P                            ! Pi
 X                            ! Observed DataEnd Matrices;
End Matrices;

! Declare matrix values here
 Matrix E
                 !Place values for MATRIX E here
 Matrix H
                 !Place values for MATRIX H here

                 !Input other matrices and values here

Begin Algebra;
 O=                           ! Fractional part:            2*pi*sqrt(det(e))                                      (5.4414)
 Q=                           ! Mahalanobis distance:       (indiv score - mean)' & inverse of covariance matrix   (0.6533)
 R=                           !                             e to the power -.5 × Mahalanobis distance              (0.7213)
 S=-T*\ln(R%O);               ! minus twice log-likelihood                                                         (4.0414)
 Z=-T*\ln(\pdfnor(X'_M'_E));  ! an easier way                                                                      (4.0414)
End Algebra;

End Group;
```

$$E=\begin{pmatrix}1 & 0.5\\ 0.5 & 1\end{pmatrix} \qquad M=\begin{pmatrix}0\\ 0\end{pmatrix}$$

$$H=\begin{pmatrix}0.5\end{pmatrix} \qquad P=\begin{pmatrix}3.141592\end{pmatrix}$$

$$T=\begin{pmatrix}2\end{pmatrix} \qquad X=\begin{pmatrix}.5\\ -.3\end{pmatrix}$$

```
#NGroups 1

TITLE: Figuring out the likelihood by hand
Calculation

!Declare matrices here
 Begin Matrices;              ! After MATRIX letter, specify type of matrix i.e. FULL or SYMMETRIC and DIMENSIONS.
 E symm 2 2                   ! Expected Covariance Matrix
 H Full 1 1                   !
 T Full 1 1                   !
 M Full 2 1                   ! Mean vector
 P Full 1 1                   ! Pi
 X Full 2 1                   ! Observed DataEnd Matrices;
End Matrices;

! Declare matrix values here
 Matrix E
                    !Place values for MATRIX E here
 Matrix H
                    !Place values for MATRIX H here

                    !Input other matrices and values here

Begin Algebra;
 O=                           ! Fractional part:          2*pi*sqrt(det(e))                                        (5.4414)
 Q=                           ! Mahalanobis distance:     (indiv score - mean)' & inverse of covariance matrix     (0.6533)
 R=                           !                           e to the power -.5 × Mahalanobis distance                (0.7213)
 S=-T*\ln(R%O);               ! minus twice log-likelihood                                                         (4.0414)
 Z=-T*\ln(\pdfnor(X'_M'_E));  ! an easier way                                                                      (4.0414)
End Algebra;

End Group;
```

$$E=\begin{pmatrix}1 & 0.5\\ 0.5 & 1\end{pmatrix} \qquad M=\begin{pmatrix}0\\ 0\end{pmatrix}$$

$$H=\begin{pmatrix}0.5\end{pmatrix} \qquad P=\begin{pmatrix}3.141592\end{pmatrix}$$

$$T=\begin{pmatrix}2\end{pmatrix} \qquad X=\begin{pmatrix}.5\\ -.3\end{pmatrix}$$

```
#NGroups 1

TITLE: Figuring out the likelihood by hand
Calculation


!Declare matrices here
 Begin Matrices; ! After MATRIX letter, specify type of matrix i.e. FULL or SYMMETRIC and DIMENSIONS.
 E symm 2 2                    ! Expected Covariance Matrix
 H Full 1 1                    !
 T Full 1 1                    !
 M Full 2 1                    ! Mean vector
 P Full 1 1                    ! Pi
 X Full 2 1                    ! Observed DataEnd Matrices;
End Matrices;

! Declare matrix values here
Matrix E
  1
  0.5 1
Matrix H
  0.5
Matrix M
  0
  0
Matrix P
  3.141592
Matrix T
  2
Matrix X
  0.5
 -0.3

Begin Algebra;
 O=                            ! Fractional part:             2*pi*sqrt(det(e))                                   (5.4414)
 Q=                            ! Mahalanobis distance:        (indiv score - mean)' & inverse of covariance matrix  (0.6533)
 R=                            !                              e to the power -.5 × Mahalanobis distance           (0.7213)
 S=-T*\ln(R%O);                ! minus twice log-likelihood                                                       (4.0414)
 Z=-T*\ln(\pdfnor(X'_M'_E));   ! an easier way                                                                    (4.0414)
End Algebra;

End Group;
```

$$E=\begin{pmatrix}1 & 0.5\\ 0.5 & 1\end{pmatrix} \qquad M=\begin{pmatrix}0\\ 0\end{pmatrix}$$

$$H=\begin{pmatrix}0.5\end{pmatrix} \qquad P=\begin{pmatrix}3.141592\end{pmatrix}$$

$$T=\begin{pmatrix}2\end{pmatrix} \qquad X=\begin{pmatrix}.5\\ -.3\end{pmatrix}$$

```
#NGroups 1

TITLE: Figuring out the likelihood by hand
Calculation


!Declare matrices here
 Begin Matrices; ! After MATRIX letter, specify type of matrix i.e. FULL or SYMMETRIC and DIMENSIONS.
 E symm 2 2                      ! Expected Covariance Matrix
 H Full 1 1                      !
 T Full 1 1                      !
 M Full 2 1                      ! Mean vector
 P Full 1 1                      ! Pi
 X Full 2 1                      ! Observed DataEnd Matrices;

! Declare matrix values here
Matrix E
  1
  0.5 1
Matrix H
  0.5
Matrix M
  0
  0
Matrix P
  3.141592
Matrix T
  2
Matrix X
  0.5
 -0.3

Begin Algebra;
 O=T*P*\sqrt\det(E);             ! Fractional part, 2pi*sqrt(det(e))                                              (5.4414)
 Q=(X-M)'&(E~);                  ! Mahalanobis Distance, (indiv score - mean)'& inverse of covariance matrix       (0.6533)
 R=\exp(-H*Q);                   ! e to the power -.5×Mahalanobis distance                                        (0.7213)
 S=-T*\ln(R%O);                  ! minus twice log-likelihood                                                     (4.0414)
 Z=-T*\ln(\pdfnor(X'_M'_E));     ! an easier way                                                                  (4.0414)
End Algebra;

End Group;
```