LAPACK

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1 LAPACK

LAPACK のインストール
Run → *Packagemanager* → *math*/*lapack* にテェックを入れて Do Install
Studio Lab で LAPACK をよむ。（進行は　Ctrl ＋ J）
以下は LAB のサマリーである

2 DIR/LOAD

```
   jpath '~addons/math/lapack'
C:\Documents and Settings\m.shimura.a\j602\addons\math\lapack

  load 'math/lapack'
```

```
  load 'math/lapack/dgeev'

    m=: ?4 4$100

 docs_jlapack_ ''  NB. display list of lap files

 routines_jlapack_ ''
```

3 Eigenvalue Eigenvector

```
  ,. dgeev_jlapack_ m  NB. compute eigenvalues and eigenvectors
+-------------------------------------------------------------+
|0.560645 _0.0626458j_0.504733 _0.0626458j0.504733 _0.0717598|
|0.453774             0.598966            0.598966  _0.647528|
|0.605618   0.0993263j0.264116 0.0993263j_0.264116   0.675244|
|0.336144   _0.439341j0.331537 _0.439341j_0.331537  _0.345837|
+-------------------------------------------------------------+
|191.201 35.5223j4.6485 35.5223j_4.6485 _36.2456              |
+-------------------------------------------------------------+
|0.603402            0.632387             0.632387 0.00106867|
|0.299213  _0.282999j0.339755  _0.282999j_0.339755  _0.505533|
|0.583476 _0.285381j0.0472792 _0.285381j_0.0472792   0.675636|
|0.453799 _0.158548j_0.543829   _0.158548j0.543829  _0.536611|
+-------------------------------------------------------------+
```

真ん中が固有値
下の段（右）が固有ベクトル

```
   >1{dgeev_jlapack_ m  NB. just the eigenvalues
186.52 _9.27616 7.25088 44.5055
```

m に乱数を用いているので解が異なる

4 Complex number

```
   >1{zgeev_jlapack_ 1j3+m        NB. eigenvalues of complex array
190.697j12.428 44.4503j_0.125584 _9.31781j_0.107504 7.1702j_0.19487
```

5 SVD decomposition

```
  ,. dgesvd_jlapack_ m           NB. SVD
+---------------------------------------+
|_0.298335  0.675393  0.119827 _0.663689  |
| _0.32215  0.545423  0.224731  0.740425  |
|_0.600719 _0.477586  0.633014  _0.10169  |
|_0.668096 _0.135169 _0.731047 0.0307745  |
+---------------------------------------+
|209.46       0       0       0           |
|     0 51.2285       0       0           |
|     0       0 43.6681       0           |
|     0       0       0 1.19157           |
+---------------------------------------+
|_0.381612  0.252384  _0.824881   0.332033|
|_0.638674  0.360149   0.560583   0.384882|
|_0.544233 _0.835064 _0.0332286 _0.0733026|
|_0.387657  0.330549  _0.064907  _0.858048|
+---------------------------------------+
```

6 Choleski decomposition

```
 load 'math/lapack/dpotrf'
   mp=: +/ . *
   dpotrf_jlapack_ m mp |: m   NB. Cholesky decomposition
120.474       0       0       0
56.6014 36.8006       0       0
109.526 21.3773 42.0136       0
76.1243 20.5502 2.14531 47.7512
```

7 QR decomposition

```
  ,. dgeqrf_jlapack_ m           NB. QR factorization
+---------------------------------+
|       1         0         0 0    |
|0.107354         1         0 0    |
```

```
|0.268384  0.592636         1 0    |
|0.195188 _0.299372 _0.752697 1    |
+----------------------------------+
|1.78308 1.38808 1.27669 0         |
+----------------------------------+
|_114.93 _79.6047 _107.717 _63.6037|
|      0 _47.4351  _10.334 _7.16445|
|      0        0  52.9545  20.8809|
|      0        0        0  30.8095|
+----------------------------------+
```

```
  dgesv_jlapack_ m;m1         NB. solves m * x = m1
 _0.277659 _0.0995368   0.380371
  0.216496  0.0892001 _0.0326221
  0.390934   0.258925  0.0514156
_0.0641417  _0.181095  _0.230422
```

8 LU decomposition

```
    dgetrf_jlapack_ m           NB. LU decomposition
+----------------------------+--------------------------+-------+
|       1         0        0 0|90      47      58       29|1 3 4 4|
|0.611111         1        0 0| 0 44.2778 22.5556  32.2778|       |
|0.444444 _0.358846        1 0| 0       0 51.3162  44.6939|       |
|0.244444  0.463237 0.591892 1| 0       0       0 _43.4951|       |
+----------------------------+--------------------------+-------+
```