Some useful commands in Octave

```
octave:368> dot([1 −2 5 4 −1], [2 3 4 0 1])        # computes a dot product of vectors
ans =  15
```

```
octave:369> cross([1 −2 5], [2 1 −4])       # computes cross product of vectors in R^3
ans =

    3    14     5
```

```
octave:371> A = round(10*rand(3, 4))−5    # combination of commands to make random integer matrix
ans =

    1    1    1    5
    0   −3    2   −3
   −2   −5   −5   −4
```

```
octave:372> rref(A)        # gives the RREF from of A
ans =

    1.00000    0.00000    0.00000    7.00000
    0.00000    1.00000    0.00000   −0.20000
    0.00000    0.00000    1.00000   −1.80000
```

```
octave:373> [L, U, P] = lu(A)       # gives matrices with  LU = PA
L =

    1.00000    0.00000    0.00000
   −0.00000    1.00000    0.00000
   −0.50000    0.50000    1.00000

U =

   −2.00000   −5.00000   −5.00000   −4.00000
    0.00000   −3.00000    2.00000   −3.00000
    0.00000    0.00000   −2.50000    4.50000

P =

Permutation Matrix

    0    0    1
    0    1    0
    1    0    0
```

```
octave:374> A \ [3; −4; 9]      # produces a particular solution of Ax=b if one exists
ans =

  −0.28754
  −0.96321
  −1.66892
   1.18393
```

```
octave:379> B = round(10*rand(3))−5;     # another random matrix, this time square
octave:380> det(B)       # calculates the determinant
ans =  66

octave:381> inv(B)       # finds the inverse matrix
ans =

   0.151515  −0.015152   0.121212
   0.272727   0.272727  −0.181818
   0.212121   0.378788  −0.030303

octave:382> rank(B)      # finds matrix rank
ans =  3

octave:383> eig(B)       # finds eigenvalues
ans =

   3.24938 + 0.00000i
   0.87531 + 4.42102i
   0.87531 − 4.42102i
```

```
octave:414> [V, lam] = eig([3 1 −1; 1 2 4; −1 4 1])      # finds eigenpairs
V =

   0.233806  −0.971525  −0.038386
  −0.645291  −0.125521  −0.753554
   0.727279   0.200956  −0.656264

lam =

Diagonal Matrix

  −2.8706         0         0
        0    3.3360         0
        0         0    5.5345
```

Compare the following QR decomposition with that displayed on p. 239:

```
octave:420> [que, ar] = qr([1 2 3; −1 0 −3; 0 −2 3])
que =
```

```
  -0.70711  -0.40825   0.57735
   0.70711  -0.40825   0.57735
  -0.00000   0.81650   0.57735

ar =

  -1.41421  -1.41421  -4.24264
   0.00000  -2.44949   2.44949
   0.00000   0.00000   1.73205
```