

# Demo document with computer code

HPL

May 5, 2015

## 1 Data file

Suppose we have some data in a file typeset with `!bc dat`:

#	A	B	C	D	E
	-0.5253	-0.9315	-0.3427	-0.1613	-0.8472
	-0.9740	-0.2558	-0.5622	-0.7635	-0.0914
	0.9216	0.7702	-0.4818	0.2155	0.2967

## 2 Complete program and terminal output

The following program (which breaks a page) reads the data in the file and performs analysis (typeset with `!bc pypro`):

```
#!/usr/bin/env python

import numpy as np

def readfile(filename):
    """Read tabular data from file and return as numpy array."""
    f = open(filename, 'r')
    data = [] # list of rows in table
    for line in f:
        if line.startswith('#'):
            continue # drop comment lines
        numbers = [float(w) for w in line.split()]
        data.append(numbers)
    return np.array(data)

def analyze(data):
    """Return statistical measures of an array data."""
    return np.mean(data), \
           np.std(data), \
           np.corrcoef(data)

if __name__ == '__main__':
    data = readfile('mydat.txt')
    # Treat each column as a variable
    m, s, c = analyze(data.transpose())
    print """
mean=%f
```

```

st.dev=%f
correlation matrix:
%s
""" % (m, s, c)

```

The output becomes (typeset with `!bc sys`):

```

Terminal> python fileread.py

mean=-0.006005
st.dev=0.583542
correlation matrix:
[[ 1.          0.0509676  0.52406366  0.20964645  0.1574504 ]
 [ 0.0509676  1.         -0.30920845 -0.12129049  0.7611538 ]
 [ 0.52406366 -0.30920845  1.         0.49355806 -0.42263817]
 [ 0.20964645 -0.12129049  0.49355806  1.         -0.38286589]
 [ 0.1574504  0.7611538  -0.42263817 -0.38286589  1.         ]]

```

### 3 Code snippet

Fortran 77 is also sometimes handy (typeset with `!bc fcod`):

```

C      subroutine process(a, n, c, r)
C      Return array r = c*a
      integer n
      real*8 a(n), c, r(n)
      integer i
      do i = 1,n
        r(i) = c*a(i)
      end do
      return
      end

```