In [4]:

```
#!/usr/bin/env python
# -*- coding: utf-8 -*-

from pylab import *
import scipy.stats

N=1000      # sample size
gamma=0.95  # confidence level

mu=10       # true mean
sigma=2     # true standard diviation
x=randn(N)*sigma+mu  # surrogate data

mu_hat=mean(x)            # sample mean
sigma_hat=std(x, ddof=1) # sample standard deviation

print('sample mean mu_hat                  : %f' % mu_hat)
print('sample standard deviation sigma_hat : %f' % sigma_hat)
l=scipy.stats.t.ppf( (1-gamma)/2, N-1)    # lower percentile
u=scipy.stats.t.ppf( 1-(1-gamma)/2, N-1)  # upper percentile
print('confidence interval mu_hat          : (%f, %f)' %
      (mu_hat+l*sigma_hat/sqrt(N), mu_hat+u*sigma_hat/sqrt(N)))
l=scipy.stats.chi2.ppf( (1-gamma)/2, N-1)    # lower percentile
u=scipy.stats.chi2.ppf( 1-(1-gamma)/2, N-1)  # upper percentile
print('confidence interval sigma_hat       : (%f, %f)' %
      ( sqrt((N-1)/u)*sigma_hat, sqrt((N-1)/l)*sigma_hat))
```

```
sample mean mu_hat                  : 9.960300
sample standard deviation sigma_hat : 2.041680
confidence interval mu_hat          : (9.833604, 10.086996)
confidence interval sigma_hat       : (1.955954, 2.135322)
```