Estudo da converg?ncia valores m?dios

August 21, 2018

In [44]:
```
%matplotlib inline
import matplotlib.pyplot as plt
import numpy as np
from astroscripts import customplots as cplot
from astroscripts import util
```

In [49]:
```
cplot.init_plotting()
```

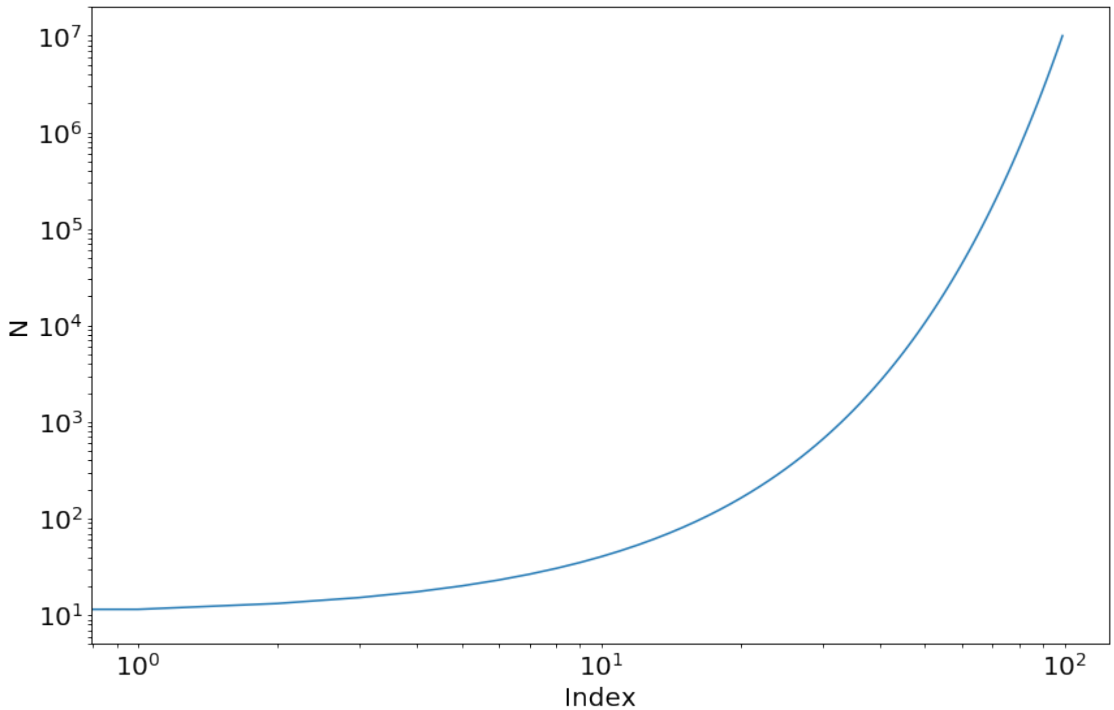
In [18]:
```
#test
N = np.geomspace(10,10**7,100)
print(N)

plt.yscale('log')
plt.xscale('log')
plt.plot(N)
plt.xlabel('Index')
plt.ylabel('N')
```

```
[1.00000000e+01 1.14975700e+01 1.32194115e+01 1.51991108e+01
 1.74752840e+01 2.00923300e+01 2.31012970e+01 2.65608778e+01
 3.05385551e+01 3.51119173e+01 4.03701726e+01 4.64158883e+01
 5.33669923e+01 6.13590727e+01 7.05480231e+01 8.11130831e+01
 9.32603347e+01 1.07226722e+02 1.23284674e+02 1.41747416e+02
 1.62975083e+02 1.87381742e+02 2.15443469e+02 2.47707636e+02
 2.84803587e+02 3.27454916e+02 3.76493581e+02 4.32876128e+02
 4.97702356e+02 5.72236766e+02 6.57933225e+02 7.56463328e+02
 8.69749003e+02 1.00000000e+03 1.14975700e+03 1.32194115e+03
 1.51991108e+03 1.74752840e+03 2.00923300e+03 2.31012970e+03
 2.65608778e+03 3.05385551e+03 3.51119173e+03 4.03701726e+03
 4.64158883e+03 5.33669923e+03 6.13590727e+03 7.05480231e+03
 8.11130831e+03 9.32603347e+03 1.07226722e+04 1.23284674e+04
 1.41747416e+04 1.62975083e+04 1.87381742e+04 2.15443469e+04
 2.47707636e+04 2.84803587e+04 3.27454916e+04 3.76493581e+04
 4.32876128e+04 4.97702356e+04 5.72236766e+04 6.57933225e+04
 7.56463328e+04 8.69749003e+04 1.00000000e+05 1.14975700e+05
 1.32194115e+05 1.51991108e+05 1.74752840e+05 2.00923300e+05
 2.31012970e+05 2.65608778e+05 3.05385551e+05 3.51119173e+05
 4.03701726e+05 4.64158883e+05 5.33669923e+05 6.13590727e+05
```

```
 7.05480231e+05 8.11130831e+05 9.32603347e+05 1.07226722e+06
 1.23284674e+06 1.41747416e+06 1.62975083e+06 1.87381742e+06
 2.15443469e+06 2.47707636e+06 2.84803587e+06 3.27454916e+06
 3.76493581e+06 4.32876128e+06 4.97702356e+06 5.72236766e+06
 6.57933225e+06 7.56463328e+06 8.69749003e+06 1.00000000e+07]
```

Out[18]: Text(0,0.5,'N')

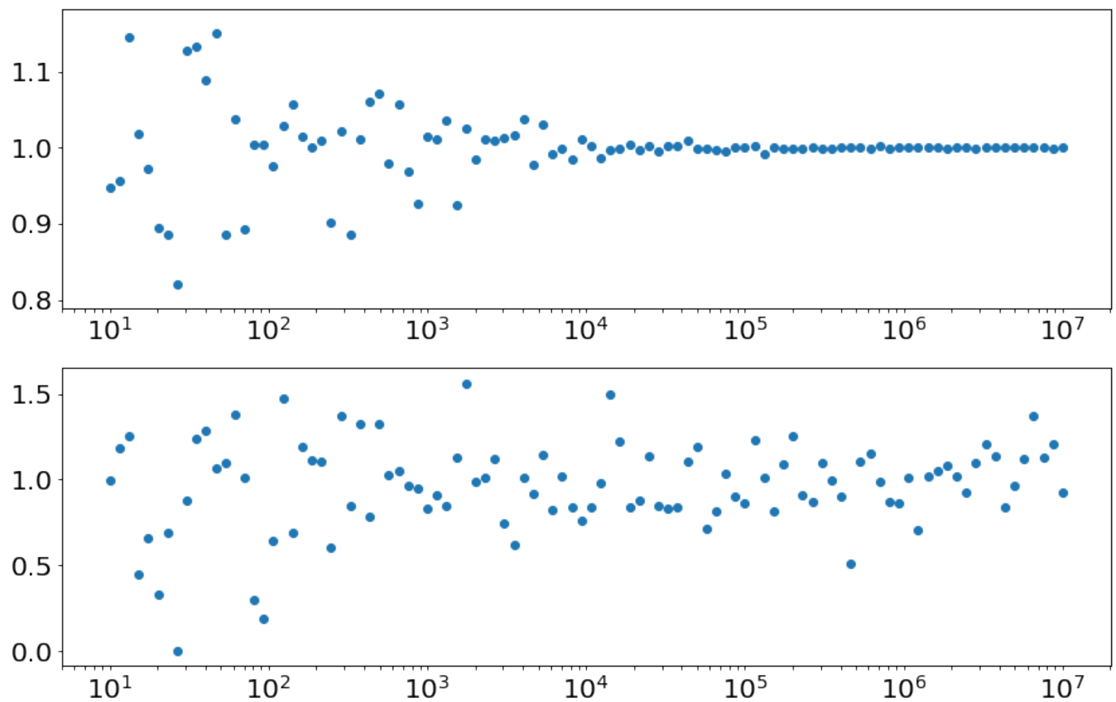


In [22]:
```
_mean = np.zeros(len(N))
_robust_mean = np.zeros(len(N))

for i in range(len(N)):
    x = np.random.normal(1,1,int(N[i]))
    _mean[i] = np.mean(x)
    _robust_mean[i] = 0.5* (np.max(x)+np.min(x))
```

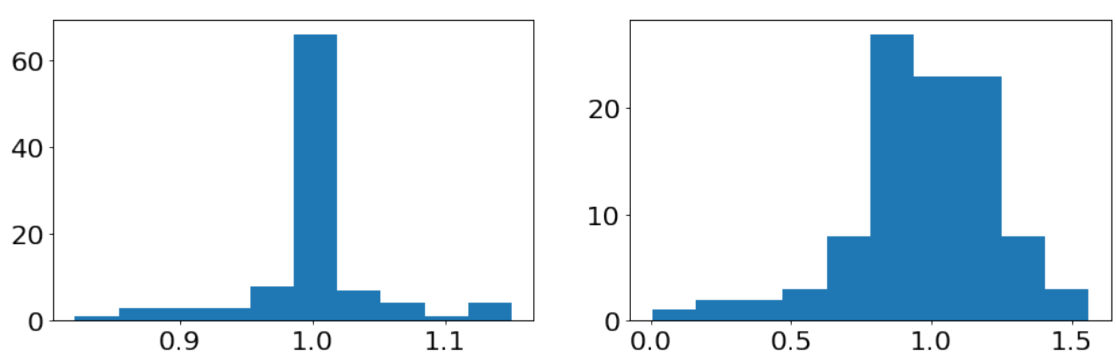
In [25]:
```
plt.subplot(211)
plt.xscale('log')
plt.scatter(N,_mean)
plt.subplot(212)
plt.xscale('log')
plt.scatter(N,_robust_mean)
```

Out[25]: <matplotlib.collections.PathCollection at 0x116488668>




```
In [36]: plt.subplot(221)
         plt.hist(_mean)
         plt.subplot(222)
         plt.hist(_robust_mean)
```

```
Out[36]: (array([ 1.,  2.,  2.,  3.,  8., 27., 23., 23.,  8.,  3.]),
          array([0.00419087, 0.15985625, 0.31552163, 0.47118701, 0.62685239,
                 0.78251777, 0.93818315, 1.09384853, 1.24951391, 1.40517929,
                 1.56084467]),
          <a list of 10 Patch objects>)
```



1 Vamos aumentar a quantidade de distribuições por cada tamanho amostral:

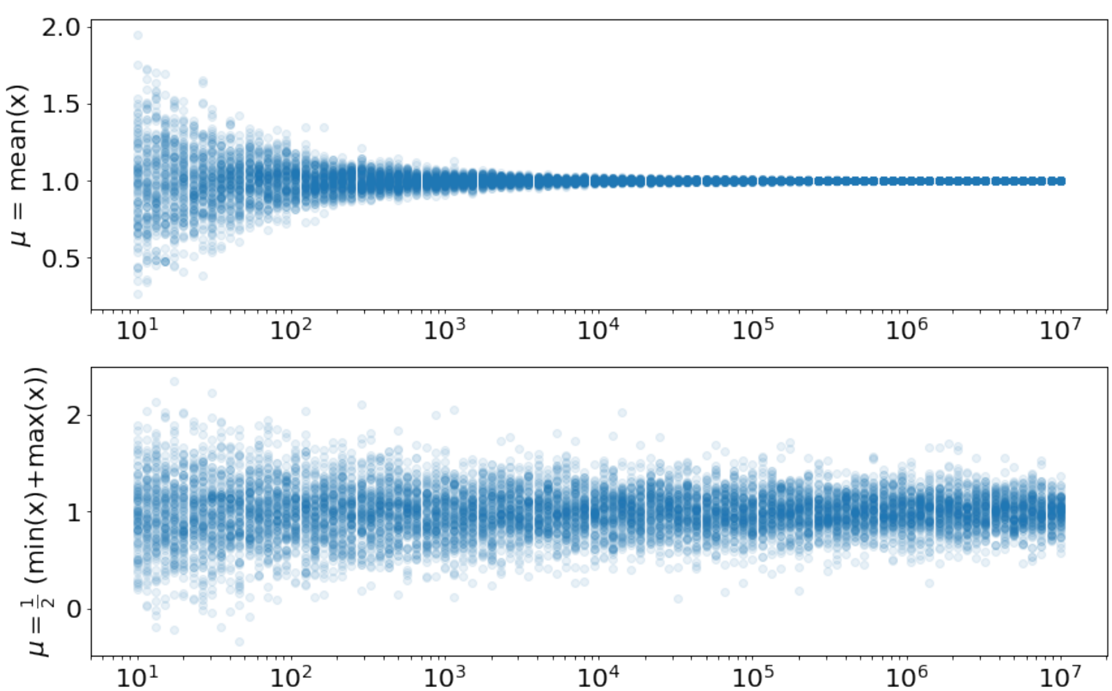
In [47]:
```
repetitions = 100
_mean = []
_robust_mean = []
_new_N = []

for i in range(len(N)):
    for k in range(repetitions): #temos 100 repetiçoes de sorteio de amostra para cad
        x = np.random.normal(1,1,int(N[i]))
        _mean.append(np.mean(x))
        _robust_mean.append(0.5* (np.max(x)+np.min(x)))
        _new_N.append(N[i])
    util.update_progress((1+i)/len(N))
```

```
Percent: [##########] 100% Done...
```

In [54]:
```
plt.subplot(211)
plt.xscale('log')
plt.scatter(_new_N,_mean,alpha=0.1)
plt.ylabel(r'$\mu$ = mean(x)')
plt.subplot(212)
plt.xscale('log')
plt.scatter(_new_N,_robust_mean,alpha=0.1)
plt.ylabel(r'$\mu = \frac{1}{2}$ (min(x)+max(x))')
```

Out[54]:
```
Text(0,0.5,'$\\mu = \\frac{1}{2}$ (min(x)+max(x))')
```



```
In [51]: plt.subplot(221)
         plt.hist(_mean)
         plt.subplot(222)
         plt.hist(_robust_mean)
```

```
Out[51]: (array([   6.,   37.,  173., 1027., 3808., 3823.,  930.,  157.,   35.,
                    4.]),
          array([-0.33956469, -0.07165176,  0.19626117,  0.4641741 ,  0.73208704,
                  0.99999997,  1.2679129 ,  1.53582583,  1.80373876,  2.0716517 ,
                  2.33956463]),
          <a list of 10 Patch objects>)
```