CSE122 Project Blackbox

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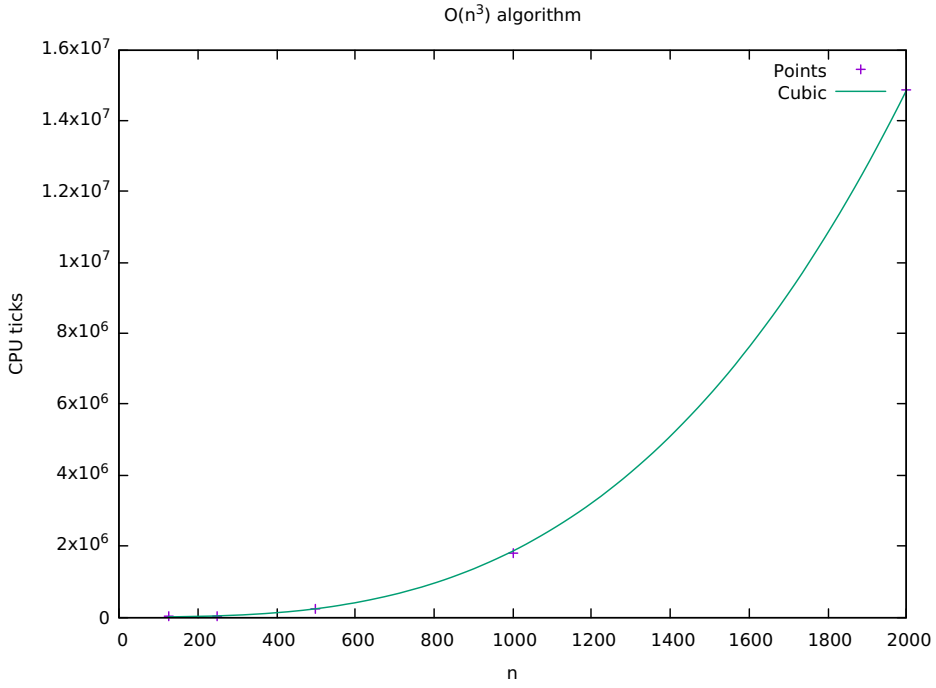
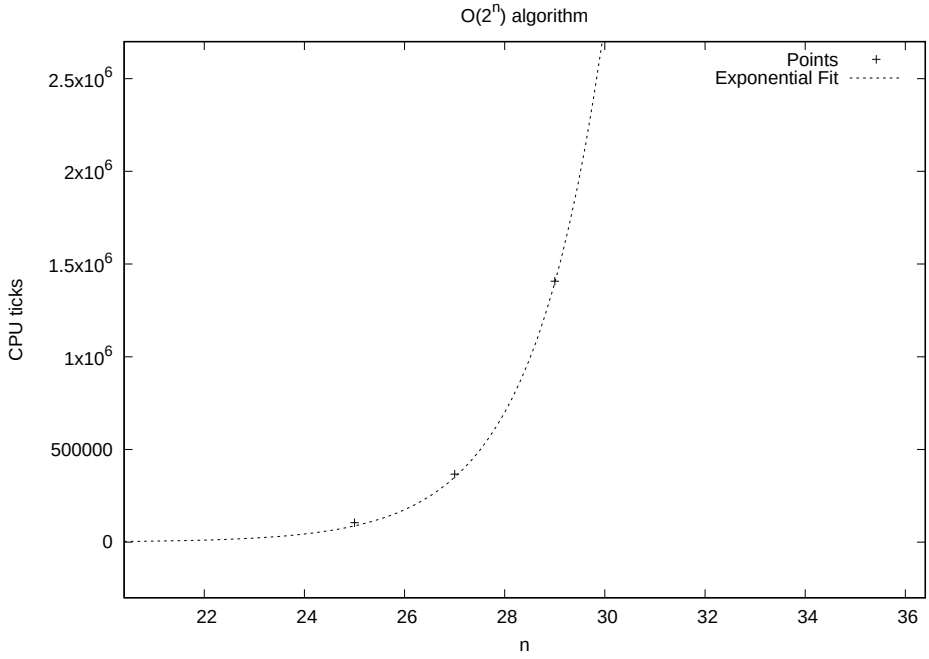
1 Function 1 Algorithmic Complexity: Cubic O(n**3)



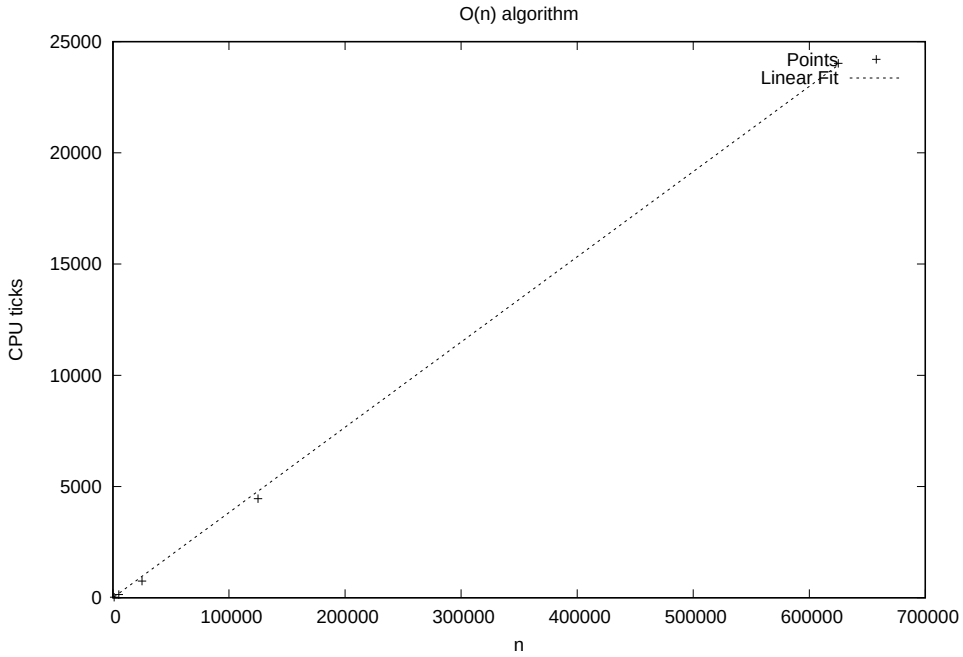

```
FIT:    data read from 'f1.txt' using 1:2
        format = x:z
        #datapoints = 5
        residuals are weighted equally (unit weight)

function used for fitting: g(x)
        g(x) = c * x**3
fitted parameters initialized with current variable values

iter      chisq       delta/lim  lambda   c
   0 8.4045908679e+20   0.00e+00  1.30e+10    3.597271e+00
   5 1.9923971534e+09   0.00e+00  1.30e+05    1.859187e-03

After 5 iterations the fit converged.
final sum of squares of residuals : 1.9924e+09
rel. change during last iteration : 0

degrees of freedom    (FIT_NDF)                        : 4
rms of residuals      (FIT_STDFIT) = sqrt(WSSR/ndf)    : 22318.1
variance of residuals (reduced chisquare) = WSSR/ndf   : 4.98099e+08

Final set of parameters            Asymptotic Standard Error
=======================            ==========================
c               = 0.00185919       +/- 2.768e-06    (0.1489%)
```

2 Function 2 Algorithmic Complexity: Exponential / O(2**n)



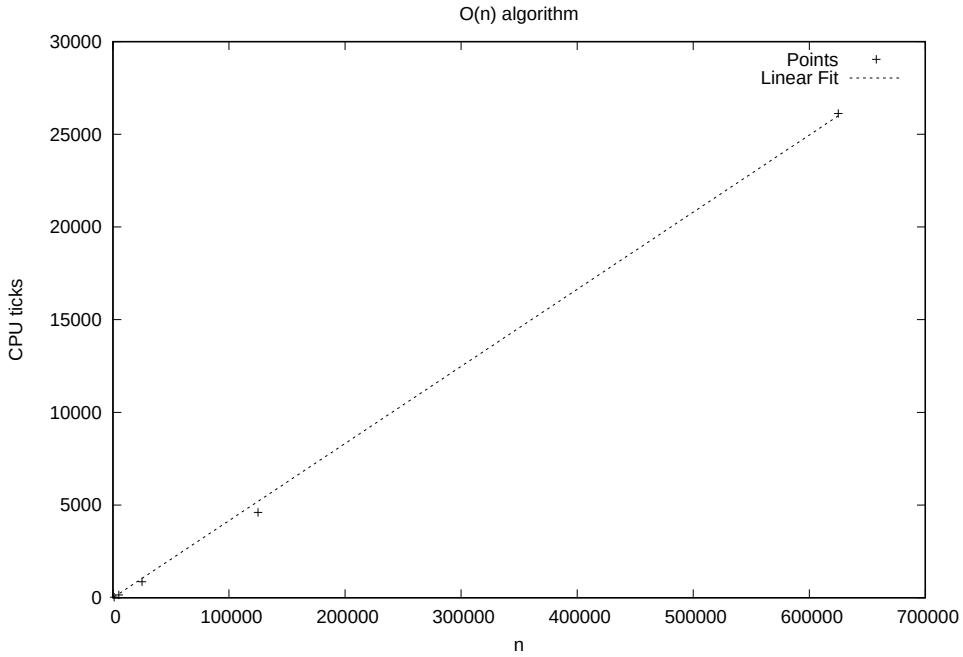

```
FIT:    data read from 'f2.txt' using 1:2
        format = x:z
        x range restricted to [20.4000 : 36.4000]
        #datapoints = 4
        residuals are weighted equally (unit weight)

function used for fitting: g(x)
        g(x) = c * 2**x
fitted parameters initialized with current variable values

iter      chisq       delta/lim  lambda   c
   0 1.4526879330e+18   0.00e+00  6.04e+08    1.000000e+00
   4 6.9105978387e+08  -3.27e-02  6.04e+04    2.607072e-03

After 4 iterations the fit converged.
final sum of squares of residuals : 6.9106e+08
rel. change during last iteration : -3.26803e-07

degrees of freedom    (FIT_NDF)                        : 3
rms of residuals      (FIT_STDFIT) = sqrt(WSSR/ndf)    : 15177.4
variance of residuals (reduced chisquare) = WSSR/ndf   : 2.30353e+08

Final set of parameters            Asymptotic Standard Error
=======================            ==========================
c               = 0.00260707       +/- 1.256e-05    (0.4818%)
```

3 Function 3 (Sorted List) Algorithmic Complexity: Linear / O(n)



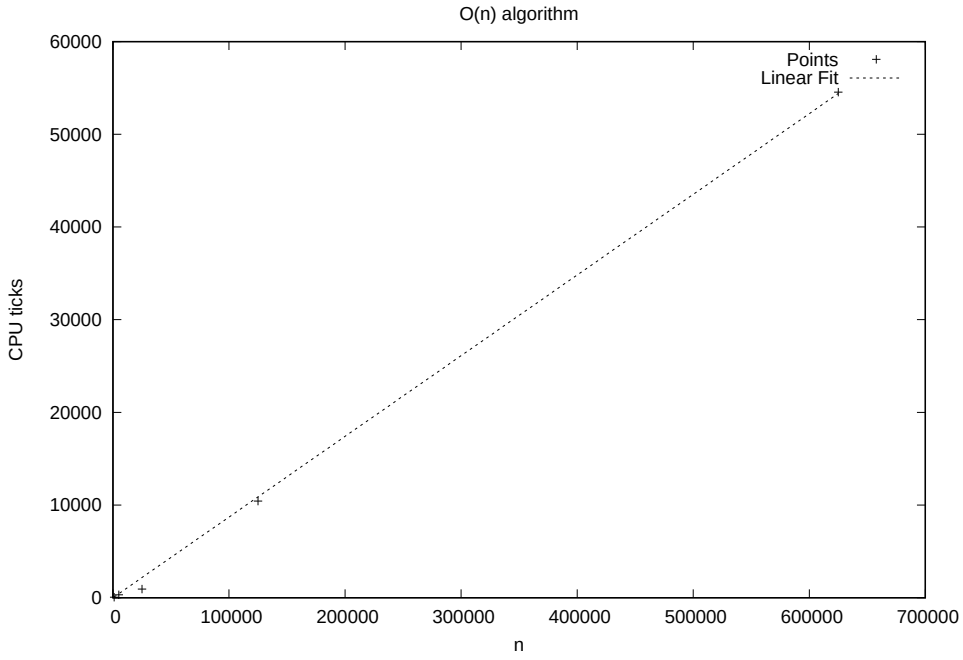

```
FIT:    data read from 'f3sort.txt' using 1:2
        format = x:z
        x range restricted to [0.00000 : 700000.]
        #datapoints = 5
        residuals are weighted equally (unit weight)

function used for fitting: g(x)
        g(x) = c * x
fitted parameters initialized with current variable values

iter      chisq       delta/lim  lambda   c
   0 3.7631916032e+11   0.00e+00  2.85e+05    1.000000e+00
   4 1.6534020729e+05  -1.01e-05  2.85e+01    3.831312e-02

After 4 iterations the fit converged.
final sum of squares of residuals : 165340
rel. change during last iteration : -1.0075e-10

degrees of freedom    (FIT_NDF)                        : 4
rms of residuals      (FIT_STDFIT) = sqrt(WSSR/ndf)    : 203.31
variance of residuals (reduced chisquare) = WSSR/ndf   : 41335.1

Final set of parameters            Asymptotic Standard Error
=======================            ==========================
c               = 0.0383131        +/- 0.0003187    (0.8319%)
```

4 Function 3 (Reverse List) Algorithmic Complexity: Linear / O(n)



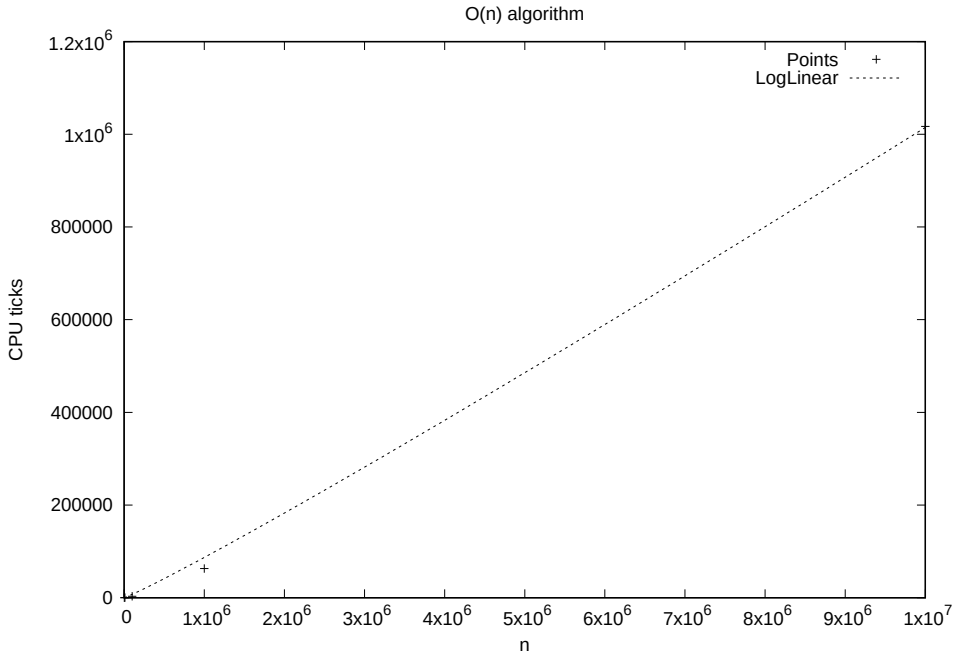

```
FIT:    data read from 'f3reverse.txt' using 1:2
        format = x:z
        #datapoints = 5
        residuals are weighted equally (unit weight)

function used for fitting: g(x)
        g(x) = c * x
fitted parameters initialized with current variable values

iter      chisq       delta/lim  lambda   c
   0 3.7375242370e+11   0.00e+00  2.85e+05    1.000000e+00
   4 4.0612312200e+05  -4.07e-06  2.85e+01    4.159870e-02

After 4 iterations the fit converged.
final sum of squares of residuals : 406123
rel. change during last iteration : -4.07387e-11

degrees of freedom    (FIT_NDF)                        : 4
rms of residuals      (FIT_STDFIT) = sqrt(WSSR/ndf)    : 318.639
variance of residuals (reduced chisquare) = WSSR/ndf   : 101531

Final set of parameters            Asymptotic Standard Error
=======================            ==========================
c               = 0.0415987        +/- 0.0004995    (1.201%)
```

5 Function 3 (Shuffle List) Algorithmic Complexity: Linear / O(n)



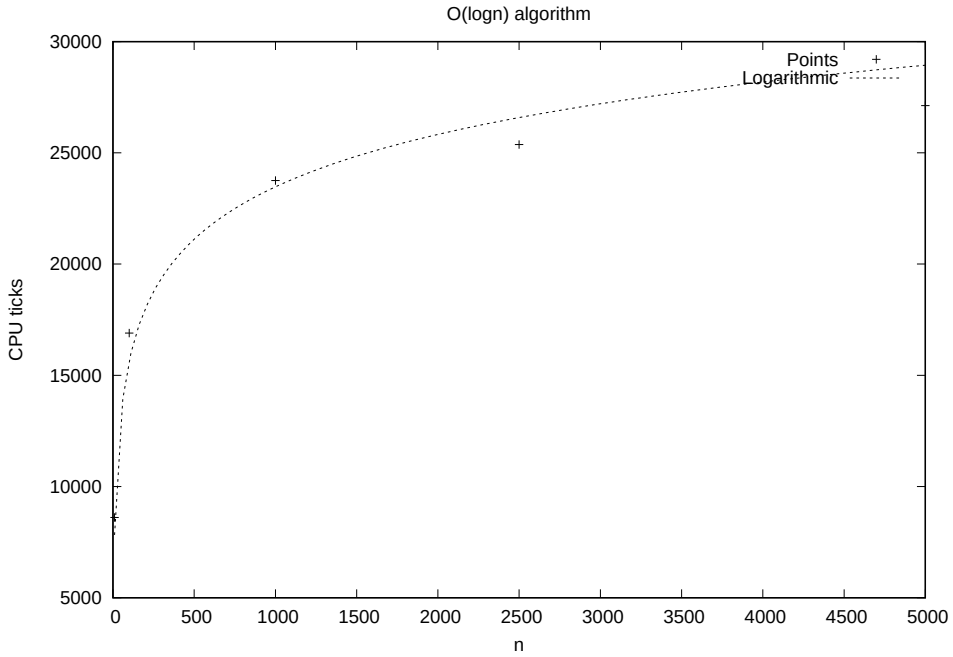

```
FIT:    data read from 'f3shuffle.txt' using 1:2
        format = x:z
        #datapoints = 5
        residuals are weighted equally (unit weight)

function used for fitting: g(x)
        g(x) = c * x
fitted parameters initialized with current variable values

iter      chisq       delta/lim  lambda   c
   0 3.3914637598e+11   0.00e+00  2.85e+05    1.000000e+00
   4 1.7872545767e+06  -8.40e-07  2.85e+01    8.704774e-02

After 4 iterations the fit converged.
final sum of squares of residuals : 1.78725e+06
rel. change during last iteration : -8.3996e-12

degrees of freedom    (FIT_NDF)                        : 4
rms of residuals      (FIT_STDFIT) = sqrt(WSSR/ndf)    : 668.441
variance of residuals (reduced chisquare) = WSSR/ndf   : 446814

Final set of parameters            Asymptotic Standard Error
=======================            ==========================
c               = 0.0870477        +/- 0.001048     (1.204%)
```

6 Function 4 Algorithmic Complexity: Log Linear / O(nlogn)



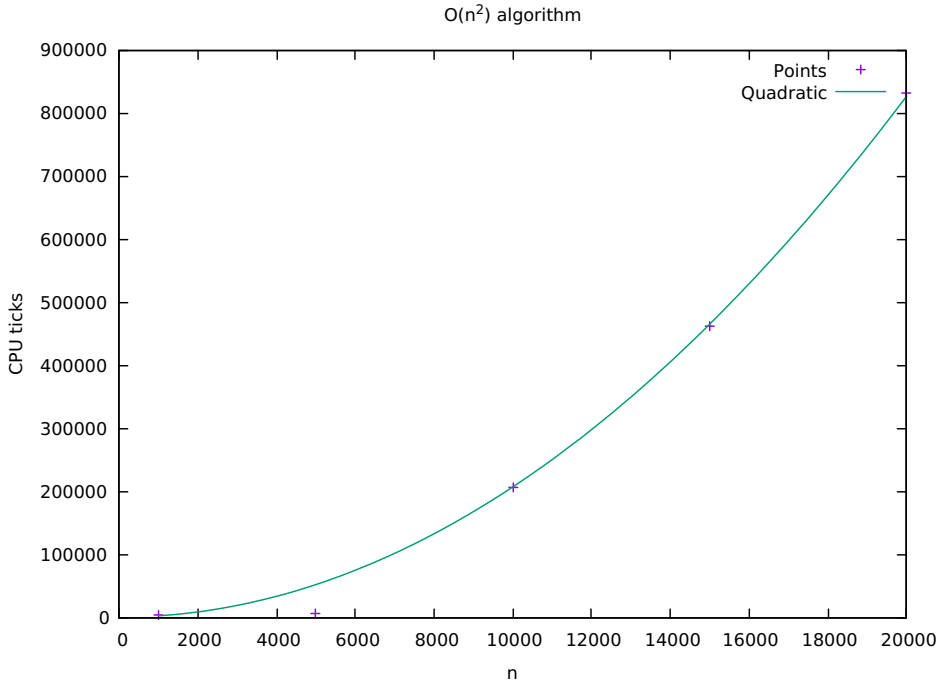

```
FIT:    data read from 'f4.txt' using 1:2
        format = x:z
        x range restricted to [0.00000 : 1.00000e+07]
        #datapoints = 5
        residuals are weighted equally (unit weight)

function used for fitting: g(x)
        g(x) = c * x*log(x)
fitted parameters initialized with current variable values

iter      chisq       delta/lim  lambda   c
   0 2.5842985222e+16   0.00e+00  7.23e+07    1.000000e+00
   4 5.9708203692e+08  -1.92e-04  7.23e+03    6.296083e-03

After 4 iterations the fit converged.
final sum of squares of residuals : 5.97082e+08
rel. change during last iteration : -1.9159e-09

degrees of freedom    (FIT_NDF)                      : 4
rms of residuals      (FIT_STDFIT) = sqrt(WSSR/ndf)    : 12217.6
variance of residuals (reduced chisquare) = WSSR/ndf   : 1.49271e+08

Final set of parameters            Asymptotic Standard Error
=======================            ==========================
c               = 0.00629608       +/- 7.552e-05    (1.2%)
```

7 Function 5 Algorithmic Complexity: Logarithmic / O(logn)



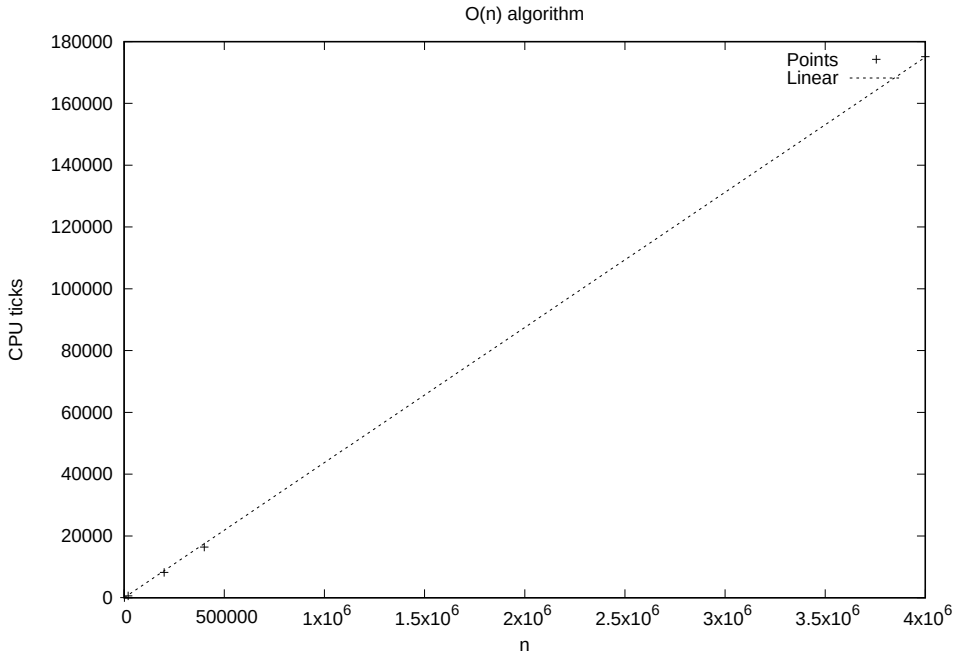

```
FIT:    data read from 'f5.txt' using 1:2
        format = x:z
        x range restricted to [-1000.00 : 4000.00]
        #datapoints = 4
        residuals are weighted equally (unit weight)

function used for fitting: g(x)
        g(x) = c * log(x)
fitted parameters initialized with current variable values

iter      chisq       delta/lim  lambda   c
   0 1.5665314041e+09   0.00e+00  5.82e+00    1.000000e+00
   4 3.7345219856e+06  -6.63e-09  5.82e-04    3.397833e+03

After 4 iterations the fit converged.
final sum of squares of residuals : 3.73452e+06
rel. change during last iteration : -6.63356e-14

degrees of freedom    (FIT_NDF)                        : 3
rms of residuals      (FIT_STDFIT) = sqrt(WSSR/ndf)    : 1115.72
variance of residuals (reduced chisquare) = WSSR/ndf   : 1.24484e+06

Final set of parameters            Asymptotic Standard Error
=======================            ==========================
c               = 3397.83          +/- 95.87        (2.821%)
```

8 Function 6 (Sorted List) Algorithmic Complexity: Quadratic / O(n**2)



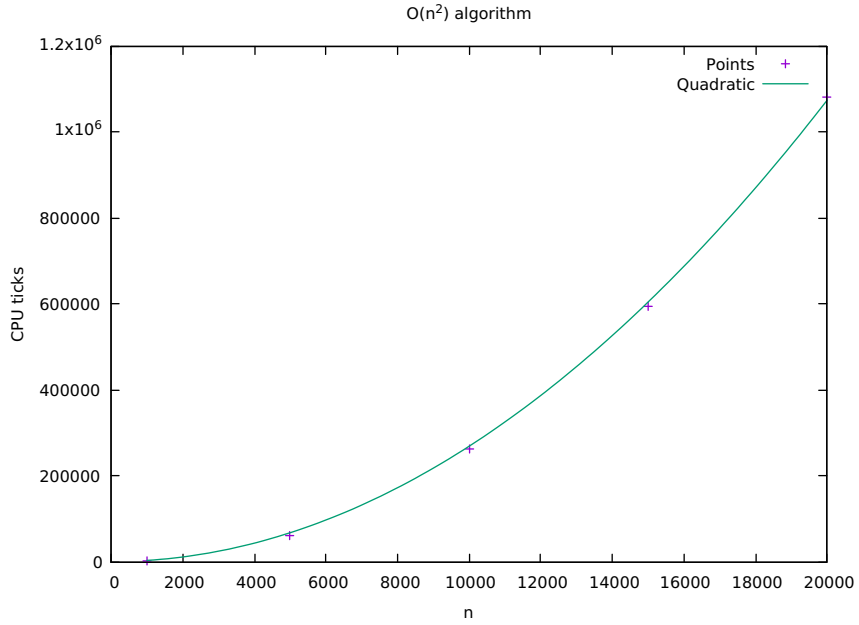

```
FIT:    data read from 'f6sortb.txt' using 1:2
        format = x:z
        #datapoints = 5
        residuals are weighted equally (unit weight)

function used for fitting: g(x)
        g(x) = c * x**2
fitted parameters initialized with current variable values

iter      chisq       delta/lim  lambda   c
   0 9.4761249237e+11   0.00e+00  3.01e+01    1.430262e-07
   4 2.1585174954e+09  -1.94e-09  3.01e-03    2.067320e-03

After 4 iterations the fit converged.
final sum of squares of residuals : 2.15852e+09
rel. change during last iteration : -1.944e-14

degrees of freedom    (FIT_NDF)                        : 4
rms of residuals      (FIT_STDFIT) = sqrt(WSSR/ndf)    : 23229.9
variance of residuals (reduced chisquare) = WSSR/ndf   : 5.39629e+08

Final set of parameters            Asymptotic Standard Error
=======================            ==========================
c               = 0.00206732       +/- 4.939e-05    (2.389%)
```

9 Function 6 (Reverse List) Algorithmic Complexity: Linear / O(n)



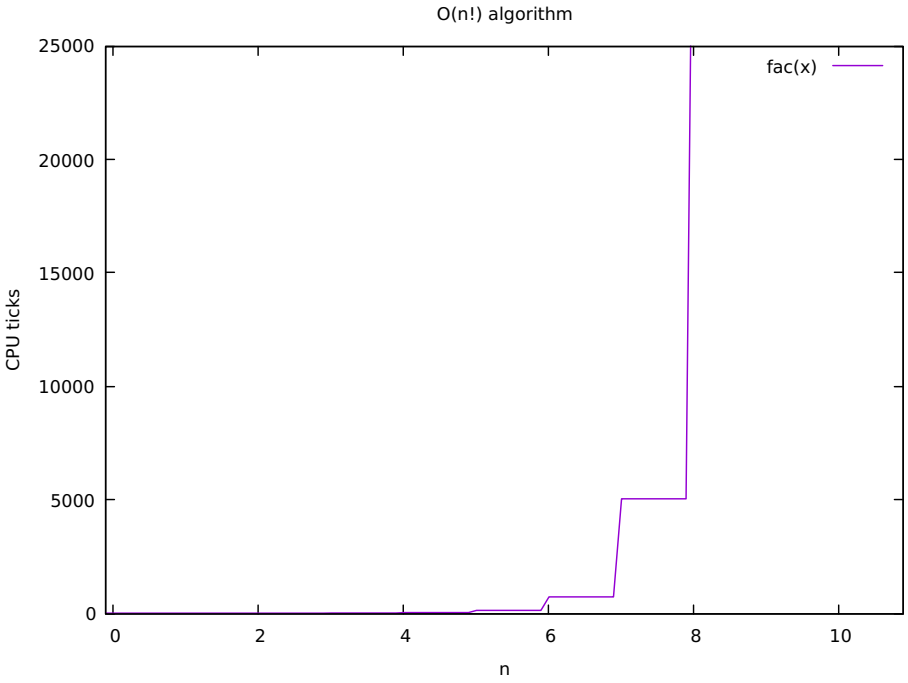

```
FIT:    data read from 'f6reverse.txt' using 1:2
        format = x:z
        #datapoints = 5
        residuals are weighted equally (unit weight)

function used for fitting: g(x)
        g(x) = c * x
fitted parameters initialized with current variable values

iter      chisq       delta/lim  lambda   c
   0 1.4814098970e+13   0.00e+00  1.80e+06    1.000000e+00
   4 1.6017257758e+06  -4.09e-05  1.80e+02    4.374281e-02

After 4 iterations the fit converged.
final sum of squares of residuals : 1.60173e+06
rel. change during last iteration : -4.09401e-10

degrees of freedom    (FIT_NDF)                        : 4
rms of residuals      (FIT_STDFIT) = sqrt(WSSR/ndf)    : 632.797
variance of residuals (reduced chisquare) = WSSR/ndf   : 400431

Final set of parameters            Asymptotic Standard Error
=======================            ==========================
c               = 0.0437428        +/- 0.0001572    (0.3594%)
```

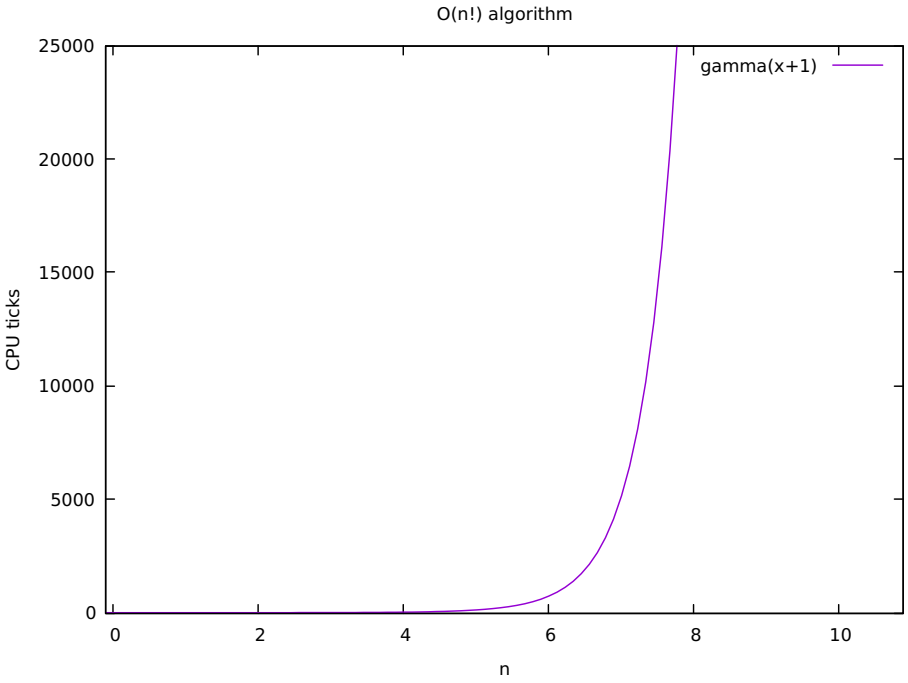
10 Function 6 (Shuffle List) Algorithmic Complexity: Quadratic / O(n**2)




```
FIT:    data read from 'f6shuffleb.txt' using 1:2
        format = x:z
        #datapoints = 5
        residuals are weighted equally (unit weight)

function used for fitting: g(x)
        g(x) = c * x**2
fitted parameters initialized with current variable values

iter      chisq       delta/lim  lambda   c
   0 5.3141858047e+26   0.00e+00  1.03e+13    4.900899e+04
   5 2.1953313568e+08  -4.28e-07  1.03e+08    2.685361e-03

After 5 iterations the fit converged.
final sum of squares of residuals : 2.19533e+08
rel. change during last iteration : -4.28464e-12

degrees of freedom    (FIT_NDF)                        : 4
rms of residuals      (FIT_STDFIT) = sqrt(WSSR/ndf)    : 7408.33
variance of residuals (reduced chisquare) = WSSR/ndf   : 5.48833e+07

Final set of parameters            Asymptotic Standard Error
=======================            ==========================
c               = 0.00268536       +/- 1.575e-05    (0.5865%)
```

11 Function 7 Algorithmic Complexity: Factorial / O(n!)





```
FIT:    data read from 'f7b.txt' using 1:2
        format = x:z
        #datapoints = 5
        residuals are weighted equally (unit weight)

function used for fitting: g(x)
        g(x) = c * fac(x)
        fac(x) = (int(x)==0) ? 1.0 : int(x) * fac(int(x)-1.0)
        [too many nested (or recursive) function definitions (max=20)]
fitted parameters initialized with current variable values

iter      chisq       delta/lim  lambda   c
   0 2.2709261637e+17   0.00e+00  2.14e+08    1.000000e+00
   4 2.7927308167e+07  -3.60e-02  2.14e+04    5.162657e-03

After 4 iterations the fit converged.
final sum of squares of residuals : 2.79273e+07
rel. change during last iteration : -3.59947e-07

degrees of freedom    (FIT_NDF)                        : 4
rms of residuals      (FIT_STDFIT) = sqrt(WSSR/ndf)    : 2642.31
variance of residuals (reduced chisquare) = WSSR/ndf   : 6.98183e+06

Final set of parameters            Asymptotic Standard Error
=======================            =========================
c               = 0.00516266       +/- 5.516e-06    (0.1068%)
```