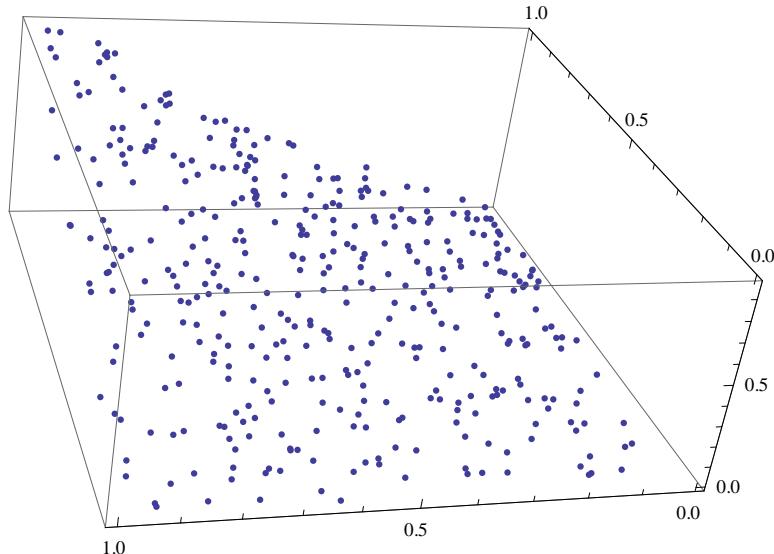


```

L = Table[{RandomReal[] * 2, Prime[x]}, {x, 20}]; f[x_, y_] := 10 x + Sin[y];
L = Table[{L[[i, 1]], L[[i, 2]], f[L[[i, 1]]], L[[i, 2]]}], {i, Length[L]}];
$Assumptions = b > 1 && o > 0 && 1 >= a >= 0
b > 1 && o > 0 && 1 >= a >= 0
c =.
model = x y a + (1 - a) (((x ^ (-b) - 1) ^ o + (y ^ (-b) - 1) ^ o) ^ (1 / o) + 1) ^ (-1 / b) /.
   b -> b ^ 2 + 0.00001 /. o -> o ^ 2 + 1 /. d -> 1 + d ^ 2
a x y + (1 - a)  $\left(1 + \left(\left(-1 + x^{-0.00001-b^2}\right)^{1+o^2} + \left(-1 + y^{-0.00001-b^2}\right)^{1+o^2}\right)^{\frac{1}{1+o^2}}\right)^{-\frac{1}{0.00001+b^2}}$ 
a =.; b =.; o =.;
u = 0.00001;
ListPointPlot3D[F]

```



```

w = RandomReal[1, {400, 2}]; F = {}; For[i = 1, i < Length[w], i++,
 AppendTo[F, {w[[i, 1]], w[[i, 2]],
 Length[Select[w, #[[1]] <= w[[i, 1]] && #[[2]] <= w[[i, 2]] &]] / Length[w]}];
]
f[t_, a_, b_, o_] := (-Log[o t ^ a + (1 - o)]) ^ b
Solve[f[t, a, b, o] == p, t]
Solve::ifun : Inverse functions are being used by Solve, so some
solutions may not be found; use Reduce for complete solution information. >

```

$$\left\{ t \rightarrow \left(-\frac{1 - e^{-\frac{1}{Pb}} - o}{o} \right)^{\frac{1}{a}} \right\}$$

```

f[0, a, b, o]
0.510826

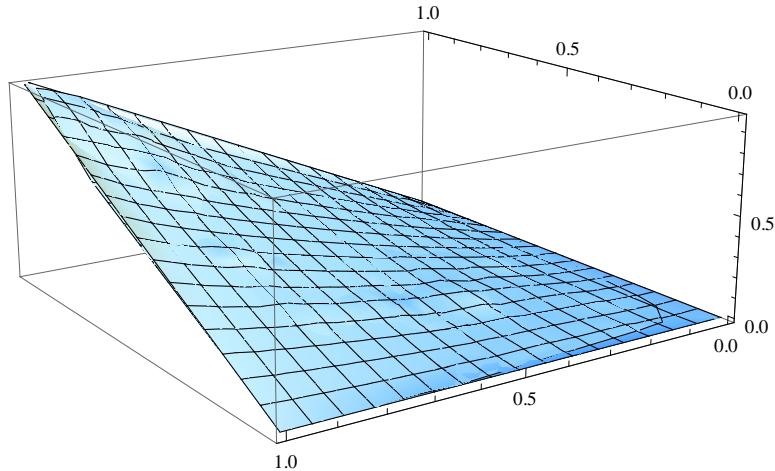
a = 0.4; b = 1; o = 0.4;

Plot[{f[t, a, b, o], 
  
$$\left( -\frac{1 - e^{-t^b} - o}{o} \right)^{\frac{1}{a}} \right\}, {t, 0, 1}, AspectRatio -> 1, PlotRange -> {0, 1}]

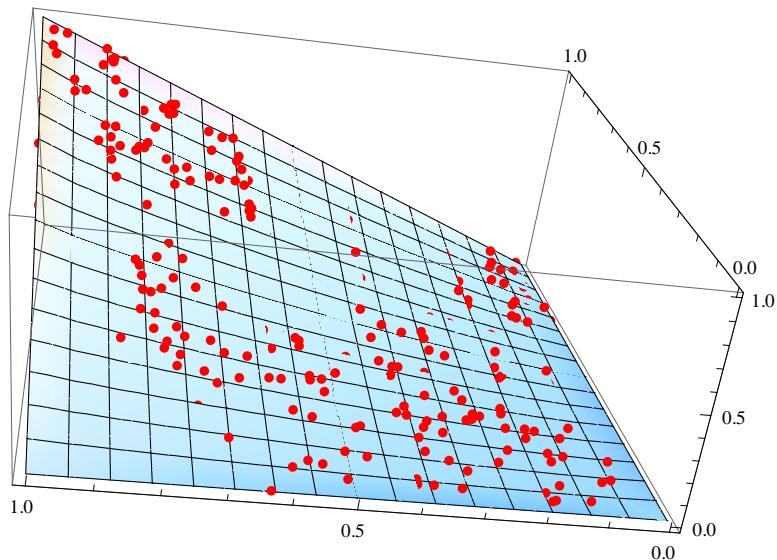
fi = FindFit[F, model, {{a, 1.0}, b, o, d}, {x, y}]
FindFit::cvmit : Failed to converge to the requested accuracy or precision within 100 iterations. >>
{a -> 341.918, b -> 0.017966, o -> 0.0233081, d -> 1.}

Show[ListPlot3D[F], Plot3D[model /. fi, {x, 0, 1}, {y, 0, 1}]]$$

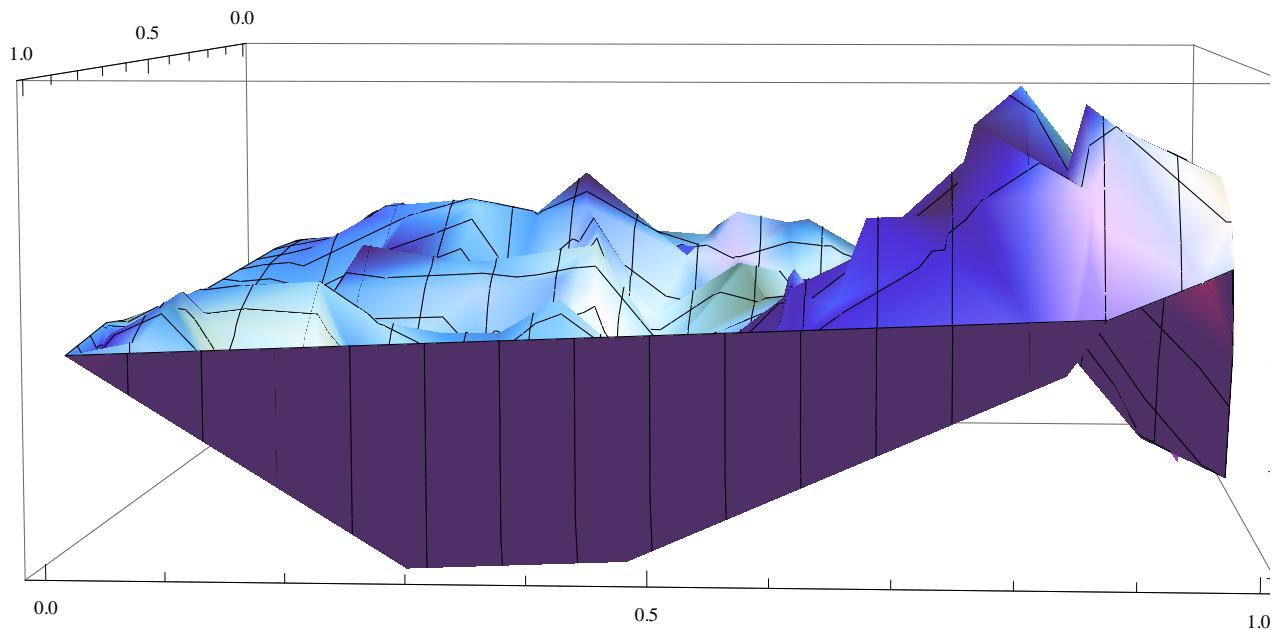
```



```
Show[ListPointPlot3D[F, PlotStyle -> Directive[PointSize[Medium], Red]],  
Plot3D[model /. fi, {x, 0, 1}, {y, 0, 1}]]
```



```
ListPlot3D[{#[[1]], #[[2]], #[[3]] - model /. fi /. x → #[[1]] /. y → #[[2]]} & /@ F,  
InterpolationOrder → 50]
```



```

{#[[1]], #[[2]], #[[3]] - model /. fi /. x → #[[1]] /. y → #[[2]]} & /@ c

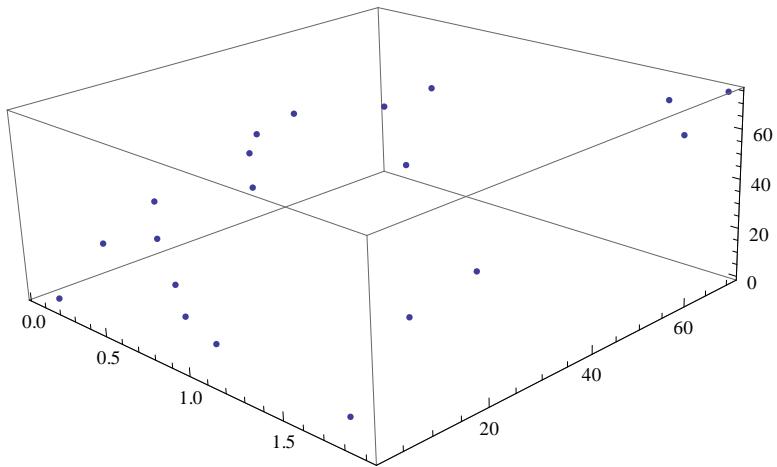
ListPlot3D[{0.38612, 0.276796, 0.339139, 0.58822, 0.0732842, 0.107194, 0.360956,
0.431692, 0.101936, 0.311469, 0.0126242, 0.100838, 0.571699, 0.0549775, 0.0575832,
0.16761, 0.255773, 0.384971, 0.518501, 0.460148, 0.05362, 0.557474, 0.0104573,
0.459694, 0.306298, 0.414205, 0.219628, 0.290776, 0.145678, 0.584657, 0.0769081,
0.101937, 0.378329, 0.178432, 0.245511, 0.0902623, 0.589878, 0.0478866, 0.276158,
0.0611864, 0.0156485, 0.270761, 0.0790041, 0.0693993, 0.720323, 0.18514, 0.110748,
0.477882, 0.226719, 0.0944798, 0.0384576, 0.340488, 0.144311, 0.0751811, 0.212142,
0.163234, 0.0648467, 0.483244, 0.657144, 0.0610038, 0.117031, 0.0153923, 0.14078,
0.0140581, 0.564859, 0.175006, 0.323312, 0.282334, 0.0420584, 0.578986, 0.030446,
0.0969057, 0.0788814, 0.123994, 0.268805, 0.624703, 0.28009, 0.125063, 0.222925,
0.347652, 0.202346, 0.0414904, 0.501146, 0.0286505, 0.129602, 0.0146292, 0.29926,
0.117237, 0.0211574, 0.131065, 0.00912669, 0.00656747, 0.359925, 7.68491 × 10-6,
0.560954, 0.00333676, 0.0289626, 0.186436, 4.03143 × 10-7, 0.237025, 0.348491,
0.239742, 0.0130885, 0.822027, 0.559685, 0.0491425, 0.119537, 0.0388942, 0.0239928,
0.00636056, 0.757082, 0.0738748, 0.0513837, 0.170153, 0.671082, 0.121733, 0.0495847,
0.369402, 0.104954, 3.05882 × 10-11, 9.99972 × 10-6, 9.99972 × 10-6, 0.999979}]

{0.38612, 0.276796, 0.339139, 0.58822, 0.0732842, 0.107194, 0.360956, 0.431692,
0.101936, 0.311469, 0.0126242, 0.100838, 0.571699, 0.0549775, 0.0575832, 0.16761,
0.255773, 0.384971, 0.518501, 0.460148, 0.05362, 0.557474, 0.0104573, 0.459694,
0.306298, 0.414205, 0.219628, 0.290776, 0.145678, 0.584657, 0.0769081, 0.101937,
0.378329, 0.178432, 0.245511, 0.0902623, 0.589878, 0.0478866, 0.276158, 0.0611864,
0.0156485, 0.270761, 0.0790041, 0.0693993, 0.720323, 0.18514, 0.110748, 0.477882,
0.226719, 0.0944798, 0.0384576, 0.340488, 0.144311, 0.0751811, 0.212142, 0.163234,
0.0648467, 0.483244, 0.657144, 0.0610038, 0.117031, 0.0153923, 0.14078, 0.0140581,
0.564859, 0.175006, 0.323312, 0.282334, 0.0420584, 0.578986, 0.030446, 0.0969057,
0.0788814, 0.123994, 0.268805, 0.624703, 0.28009, 0.125063, 0.222925, 0.347652,
0.202346, 0.0414904, 0.501146, 0.0286505, 0.129602, 0.0146292, 0.29926, 0.117237,
0.0211574, 0.131065, 0.00912669, 0.00656747, 0.359925, 7.68491 × 10-6, 0.560954,
0.00333676, 0.0289626, 0.186436, 4.03143 × 10-7, 0.237025, 0.348491, 0.239742,
0.0130885, 0.822027, 0.559685, 0.0491425, 0.119537, 0.0388942, 0.0239928,
0.00636056, 0.757082, 0.0738748, 0.0513837, 0.170153, 0.671082, 0.121733, 0.0495847,
0.369402, 0.104954, 3.05882 × 10-11, 9.99972 × 10-6, 9.99972 × 10-6, 0.999979}

```

ListÜ

```
Show[60, Plot[model /. %, {x, 0, 2}, {y, 0, 80}]]
```



Min[Flatten[c]]

0.00001

```
c = {{0.754237` , 0.533898` , 0.386555` },
{0.338983` , 0.847458` , 0.252101` }, {0.983051` , 0.347458` , 0.352941` },
{0.90678` , 0.661017` , 0.596639` }, {0.194915` , 0.423729` , 0.07563` },
{0.516949` , 0.228814` , 0.109244` }, {0.5` , 0.754237` , 0.352941` },
{0.872881` , 0.508475` , 0.436975` }, {0.652542` , 0.169492` , 0.084034` },
{0.449153` , 0.728814` , 0.310924` }, {0.076271` , 0.20339` , 0.02521` },
{0.788136` , 0.135593` , 0.084034` }, {0.79661` , 0.737288` , 0.554622` },
{0.70339` , 0.084746` , 0.042017` }, {0.161017` , 0.40678` , 0.067227` },
{0.610169` , 0.29661` , 0.159664` }, {0.271186` , 0.957627` , 0.260504` },
{0.389831` , 0.991525` , 0.386555` }, {0.542373` , 0.966102` , 0.521008` },
{0.847458` , 0.559322` , 0.462185` }, {0.101695` , 0.584746` , 0.058824` },
{0.711864` , 0.805085` , 0.563025` }, {0.118644` , 0.110169` , 0.016807` },
{0.949153` , 0.491525` , 0.470588` }, {0.627119` , 0.516949` , 0.310924` },
{0.923729` , 0.457627` , 0.428571` }, {0.644068` , 0.364407` , 0.226891` },
{0.322034` , 0.923729` , 0.294118` }, {0.661017` , 0.237288` , 0.142857` },
{0.737288` , 0.813559` , 0.579832` }, {0.177966` , 0.483051` , 0.084034` },
{0.262712` , 0.432203` , 0.10084` }, {0.584746` , 0.677966` , 0.386555` },
{0.432203` , 0.449153` , 0.176471` }, {0.669492` , 0.389831` , 0.260504` },
{0.211864` , 0.474576` , 0.10084` }, {0.720339` , 0.838983` , 0.588235` },
{0.144068` , 0.381356` , 0.058824` }, {0.533898` , 0.550847` , 0.285714` },
{0.084746` , 0.771186` , 0.07563` }, {0.364407` , 0.050847` , 0.008403` },
```

```

{0.313559`, 0.889831`, 0.268908`}, {0.881356`, 0.09322`, 0.07563`},
{0.483051`, 0.161017`, 0.067227`}, {1.-u, 0.720339`, 0.722689`},
{0.618644`, 0.322034`, 0.184874`}, {0.771186`, 0.152542`, 0.084034`},
{0.59322`, 0.830508`, 0.470588`}, {0.254237`, 0.915254`, 0.243697`},
{0.127119`, 0.788136`, 0.117647`}, {0.067797`, 0.627119`, 0.042017`},
{0.508475`, 0.70339`, 0.336134`}, {0.398305`, 0.398305`, 0.12605`},
{0.279661`, 0.305085`, 0.067227`}, {0.347458`, 0.652542`, 0.218487`},
{0.355932`, 0.5`, 0.159664`}, {0.110169`, 0.644068`, 0.07563`},
{0.838983`, 0.59322`, 0.478992`}, {0.966102`, 0.686441`, 0.663866`},
{0.372881`, 0.186441`, 0.042017`}, {0.491525`, 0.262712`, 0.109244`},
{0.025424`, 0.669492`, 0.02521`}, {0.169492`, 0.864407`, 0.151261`},
{0.050847`, 0.330508`, 0.02521`}, {0.728814`, 0.79661`, 0.563025`},
{0.559322`, 0.338983`, 0.176471`}, {0.567797`, 0.601695`, 0.319328`},
{0.677966`, 0.440678`, 0.310924`}, {0.40678`, 0.118644`, 0.042017`},
{0.762712`, 0.779661`, 0.563025`}, {0.457627`, 0.076271`, 0.033613`},
{0.305085`, 0.355932`, 0.084034`}, {0.135593`, 0.635593`, 0.084034`},
{0.474576`, 0.288136`, 0.117647`}, {0.288136`, 0.949153`, 0.268908`},
{0.745763`, 0.855932`, 0.621849`}, {0.415254`, 0.711864`, 0.277311`},
{0.440678`, 0.313559`, 0.117647`}, {0.576271`, 0.415254`, 0.218487`},
{0.525424`, 0.694915`, 0.344538`}, {0.855932`, 0.245763`, 0.210084`},
{0.228814`, 0.211864`, 0.042017`}, {0.694915`, 0.745763`, 0.512605`},
{0.330508`, 0.101695`, 0.016807`}, {0.152542`, 0.881356`, 0.151261`},
{0.016949`, 0.898305`, 0.02521`}, {0.550847`, 0.576271`, 0.294118`},
{0.237288`, 0.542373`, 0.134454`}, {0.09322`, 0.271186`, 0.033613`},
{0.779661`, 0.177966`, 0.109244`}, {0.423729`, 0.025424`, 0.008403`},
{0.042373`, 0.194915`, 0.016807`}, {0.974576`, 0.372881`, 0.369748`},
{0.830508`, u, 0.008403`}, {0.991525`, 0.567797`, 0.571429`},
{0.008475`, 0.466102`, 0.016807`}, {0.889831`, 0.033898`, 0.042017`},
{0.186441`, 1.-u, 0.193277`}, {u, 0.067797`, 0.008403`},
{0.245763`, 0.974576`, 0.243697`}, {0.381356`, 0.932203`, 0.352941`},
{0.957627`, 0.254237`, 0.260504`}, {0.822034`, 0.016949`, 0.016807`},
{0.915254`, 0.90678`, 0.823529`}, {0.932203`, 0.610169`, 0.563025`},
{0.20339`, 0.279661`, 0.05042`}, {0.864407`, 0.144068`, 0.117647`},
{0.940678`, 0.042373`, 0.05042`}, {0.033898`, 0.762712`, 0.033613`},
{0.805085`, 0.008475`, 0.008403`}, {0.813559`, 0.940678`, 0.756303`},
{0.635593`, 0.127119`, 0.067227`}, {0.898305`, 0.059322`, 0.058824`},
{0.29661`, 0.618644`, 0.168067`}, {0.686441`, 0.983051`, 0.672269`},
{0.601695`, 0.220339`, 0.109244`}, {0.059322`, 0.872881`, 0.058824`},
{0.466102`, 0.822034`, 0.352941`}, {0.220339`, 0.525424`, 0.117647`},
{u, u, u}, {u, 1-u, u}, {1.-u, u, u}, {1, 1, 1} (1-u)};

```

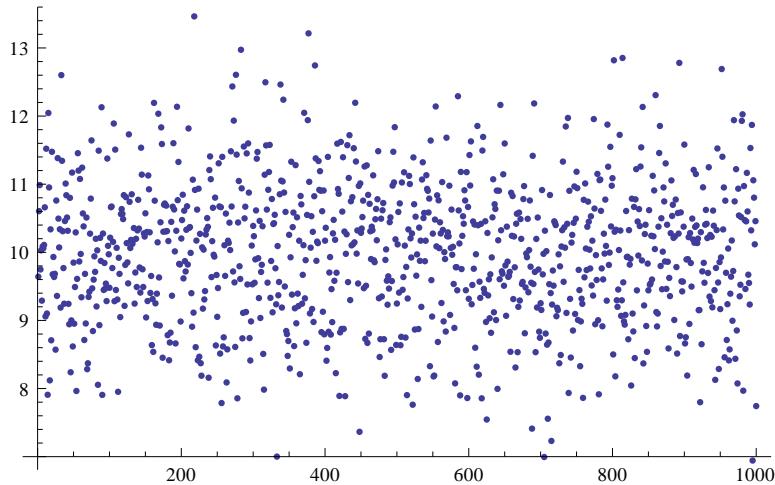
Normal

```

PDF[NormalDistribution[a, b], x]
L = RandomReal[NormalDistribution[10, 1], 1000];

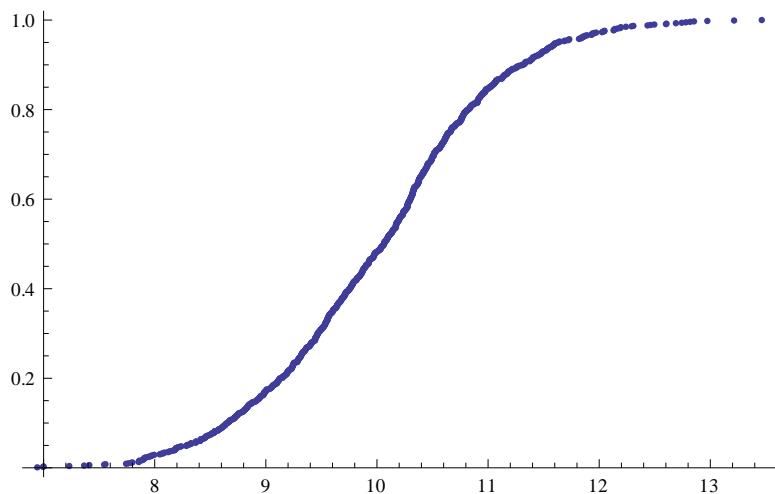
```

```
ListPlot[L]
```



```
n = Length[L]; Ls = Sort[L]; F = Table[{Ls[[i]], i / n}, {i, 1, n}];
```

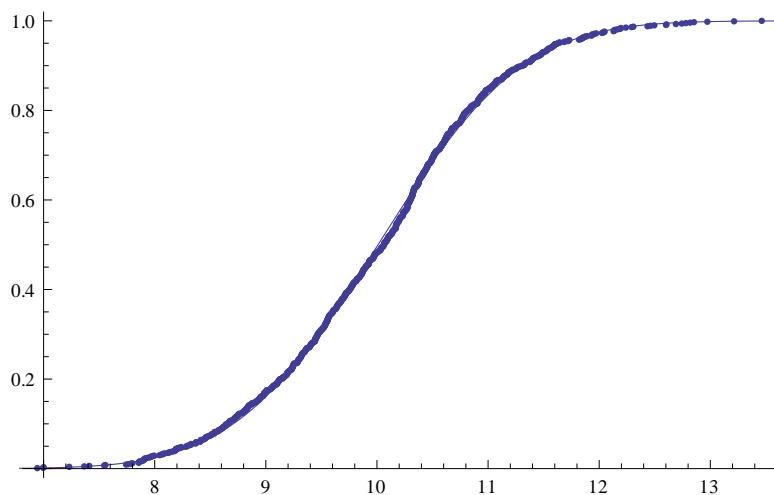
```
ListPlot[F]
```



```
fi = FindFit[F, CDF[NormalDistribution[a, b], x], {a, b}, x]
```

```
{a → 10.01, b → 1.01656}
```

```
Show[ListPlot[F], Plot[CDF[NormalDistribution[a, b], x] /. fi, {x, 6, 14}]]
```



```
CDF[NormalDistribution[a, b], x]
```

$$\frac{1}{2} \left(1 + \text{Erf} \left[\frac{-a + x}{\sqrt{2} b} \right] \right)$$

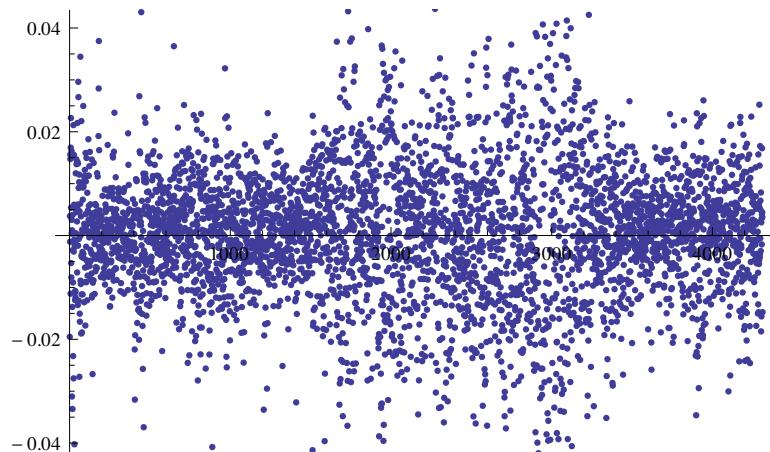
DAX

fit

```
g[[1]]
```

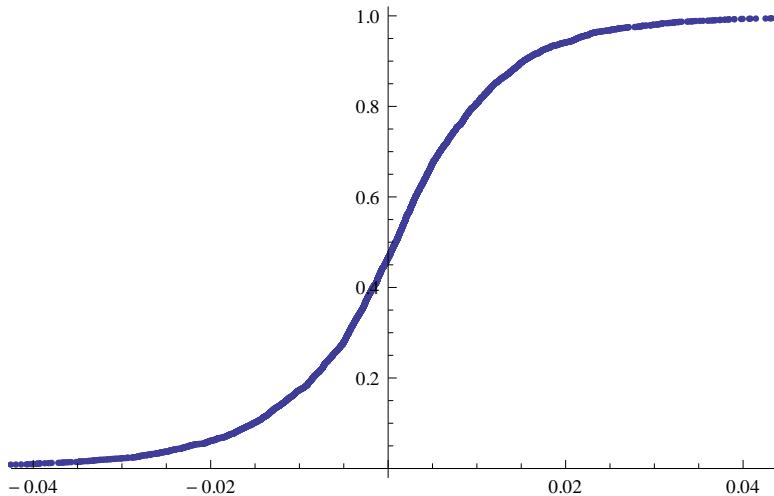
```
1443.2
```

```
d = Differences[Log /@ g]; ListPlot[d]
```



```
n = Length[d]; ds = Sort[d]; F = Sort[Table[{ds[[i]], i/n}, {i, 1, n}]];
```

```
ListPlot[F]
```



```
model = b / Abs[x - u]^(1 + a)
```

$$b \operatorname{Abs}[-u + x]^{-1-a}$$

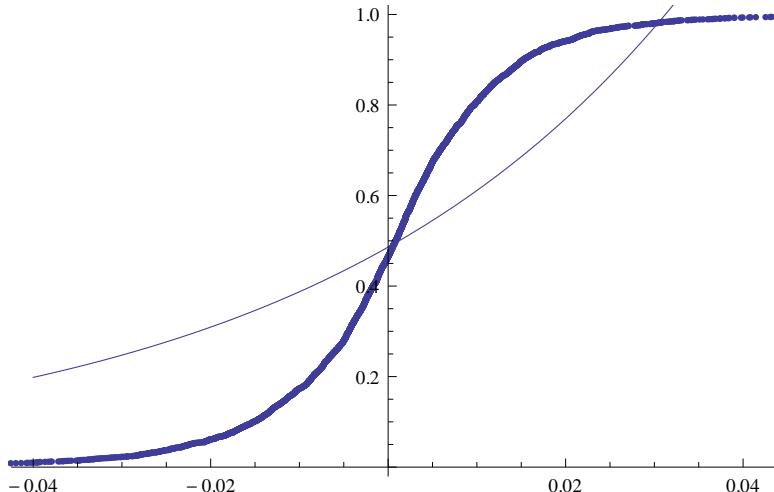
```
model = CDF[NormalDistribution[a, b], x]
```

$$\frac{1}{2} \left(1 + \operatorname{Erf} \left[\frac{-a + x}{\sqrt{2} b} \right] \right)$$

```
fi = FindFit[F, model, {a, b, u}, x]
```

```
FindFit::cvmit : Failed to converge to the requested accuracy or precision within 100 iterations. >>
{a → 26.5444, b → 89.7156, u → 1.20858}
```

```
Show[ListPlot[{F}], Plot[model /. fi, {x, -0.04, 0.04}]]
```



```
StandardDeviation[NormalDistribution[a, b]] /. fi
```

$$0.0108574$$

```
Sum[F[[i, 1]] * (F[[i + 1, 2]] - F[[i, 2]]), {i, 1, n - 1}] // N
0.00037817

StandardDeviation[ds]
0.0137907

2500 * .01
25.

100
100

Sum[25^i Exp[-25] / i!, {i, 0, 20}] // N
0.185492

Sum[2500! / k! / (2500 - k)! .01^k (1 - .01)^(2500 - k), {k, 0, 20}]
0.184188
```