```
> restart;
  read("c:/appl/appl7.txt");
```

PROCEDURES:

AllPermutations(n), AllCombinations(n, k), Benford(X), BootstrapRV(Data),
CDF:CHF:HF:IDF:PDF:SF(X, [x])), CoefOfVar(X), Convolution(X, Y),
ConvolutionIID(X, n), CriticalPoint(X, prob), Determinant(MATRIX), Difference(X, Y),
Display(X), ExpectedValue(X, [g]), KSTest(X, Data, Parameters), Kurtosis(X),
Maximum(X, Y), MaximumIID(X, n), Mean(X), MGF(X), Minimum(X, Y),
MinimumIID(X, n), Mixture(MixParameters, MixRVs),
MLE(X, Data, Parameters, [Rightcensor]), MLENHPP(X, Data, Parameters, obstime),
MLEWeibull(Data, [Rightcensor]), MOM(X, Data, Parameters),
NextCombination(Previous, size), NextPermutation(Previous), OrderStat(X, n, r, ["wo"]),
PlotDist(X, [low], [high]), PlotEmpCDF(Data, [low], [high]),
PlotEmpCIF(Data, [low], [high]), PlotEmpSF(Data, Censor),
PlotEmpVsFittedCDF(X, Data, Parameters, [low], [high]),
PlotEmpVsFittedCDF(X, Data, Parameters, [low], [high]),
PlotEmpVsFittedSF(X, Data, Parameters, Censor, low, high),
PPPlot(X, Data, Parameters), Product(X, Y), ProductIID(X, n),
QQPlot(X, Data, Parameters), RangeStat(X, n, ["wo"]), Skewness(X), Transform(X, g),
Truncate(X, low, high), Variance(X), VerifyPDF(X)

Procedure Notation:
X and Y are random variables
Greek letters are numeric or symbolic parameters
x is numeric or symbolic
n and r are positive integers, n >= r
low and high are numeric
g is a function
Brackets [] denote optional parameters
"double quotes" denote character strings
MATRIX is a 2 x 2 array of random variables
A capitalized parameter indicates that it must be
entered as a list --> ex. Data := [1, 12.4, 34, 52.45, 63]

Variate Generation:

ArcTanVariate(alpha, phi), BinomialVariate(n, p, m), ExponentialVariate(lambda),
NormalVariate(mu, sigma), UniformVariate(), WeibullVariate(lambda, kappa, m)

DATA SETS:

BallBearing, HorseKickFatalities, Hurricane, MP6, RatControl, RatTreatment, USSHalfBeak

ArcSinRV(), ArcTanRV(alpha, phi), BetaRV(alpha, beta), CauchyRV(a, alpha), ChiRV(n),

ChiSquareRV(n), ErlangRV(lambda, n), ErrorRV(mu, alpha, d), ExponentialRV(lambda), ExponentialPowerRV(lambda, kappa), ExtremeValueRV(alpha, beta), FRV(n1, n2), GammaRV(lambda, kappa), GeneralizedParetoRV(gamma, delta, kappa), GompertzRV(delta, kappa), HyperbolicSecantRV(), HyperExponentialRV(p, l), HypoExponentialRV(l), IDBRV(gamma, delta, kappa), InverseGaussianRV(lambda, mu), InvertedGammaRV(alpha, beta), KSRV(n), LaPlaceRV(omega, theta), LogGammaRV(alpha, beta), LogisticRV(kappa, lambda), LogLogisticRV(lambda, kappa), LogNormalRV(mu, sigma), LomaxRV(kappa, lambda), MakehamRV(gamma, delta, kappa), MuthRV(kappa), NormalRV(mu, sigma), ParetoRV(lambda, kappa), RayleighRV(lambda), StandardCauchyRV(), StandardNormalRV(), StandardTriangularRV(m), StandardUniformRV(), TRV(n), TriangularRV(a, m, b), UniformRV(a, b), WeibullRV(lambda, kappa)

```
Error, attempting to assign to `DataSets` which is protected.
Try declaring `local DataSets`; see ?protect for details.
```

```
> bf := MuthRV(a);
  bfname := "MuthRV(a)";
Originally a, renamed a~:
  is assumed to be: RealRange(Open(0),1)
```

$$bf := \left[\left[x \to \left(e^{a\sim x} - a\right) e^{-\frac{e^{a\sim x}}{a\sim} + a\sim x + \frac{1}{a\sim}}\right], [0, \infty], ["\text{Continuous}", "\text{PDF}"]\right]$$

$$bfname := "\text{MuthRV(a)}" \quad (1)$$

```
> #plot(1/csch(t)+1, t = 0..0.0010);
  #plot(diff(1/csch(t),t), t=0..0.0010);
  #limit(1/csch(t), t=0);
> solve(exp(-t) = y, t);
```

$$-\ln(y) \quad (2)$$

```
> # discarded  -ln(t + 1),  t-> csch(t),t->arccsch(t),t -> tan(t),
> #name of the file for latex output
  filename := "C:/Latex_Output_2/Muth_Gen.tex";


  glist := [t -> t^2 , t -> sqrt(t),  t -> 1/t,  t -> arctan(t),  t
  -> exp(t), t -> ln(t), t -> exp(-t), t -> -ln(t),  t -> ln(t+1),
  t -> 1/(ln(t+2)), t -> tanh(t), t -> sinh(t), t -> arcsinh(t),
  t-> csch(t+1),t->arccsch(t+1), t-> 1/tanh(t+1), t->  1/sinh(t+1),
   t->  1/arcsinh(t+1), t->  1/csch(t)+1, t-> tanh(1/t), t->csch
  (1/t), t-> arccsch(1/t), t-> arctanh(1/t)  ]:

  base := t -> PDF(bf, t):

  print(base(x)):

  #begin latex file formatting
  appendto(filename);
```

```
  printf("\\documentclass[12pt]{article} \n");
  printf("\\usepackage{amsfonts} \n");
  printf("\\begin{document} \n");
  print(bfname);
  printf("$$");
  latex(bf[1]);
  printf("$$");
writeto(terminal);

#begin loopint through transformations
for i from 1 to 22 do
#for i from 1 to 3 do
   print( "i is", i, "  ----------------------------------------
------------------------------------------------------------
-------------");

   g := glist[i]:
   l := bf[2][1];
   u := bf[2][2];
   Temp := Transform(bf, [[unapply(g(x), x)],[l,u]]);

  #terminal output
  print( "l and u", l, u );
  print("g(x)", g(x), "base", base(x),bfname);
  print("f(x)", PDF(Temp, x));



  #latex output
  appendto(filename);
  printf("----------------------------------------------------------
-----------------------------------  \\\\");
  printf("$$");
  latex(glist[i]);
  printf("$$");
  printf("Probability Distribution Function \n$$  f(x)=");
  latex(PDF(Temp,x));
  printf(" \\qquad");
  latex(Temp[2][1]);
  printf(" < x < ");
  latex(Temp[2][2]);
  printf("$$");



  writeto(terminal);


od;

#final latex output
appendto(filename);
printf("\\end{document}\n");
writeto(terminal);
```

$$filename := \text{"C:/Latex\_Output\_2/Muth\_Gen.tex"}$$

$$\left(e^{a\sim x} - a\sim\right) e^{-\frac{e^{a\sim x}}{a\sim} + a\sim x + \frac{1}{a\sim}}$$

"i is", 1,

" ----------"

$$g := t \to t^2$$

$$l := 0$$

$$u := \infty$$

$$Temp := \left[\left[y\sim \to \frac{1}{2} \frac{\left(e^{a\sim\sqrt{y\sim}} - a\sim\right) e^{-\frac{-a\sim^2\sqrt{y\sim} + e^{a\sim\sqrt{y\sim}} - 1}{a\sim}}}{\sqrt{y\sim}}\right], [0, \infty], [\text{"Continuous"}, \text{"PDF"}]\right]$$

"l and u", 0, ∞

"g(x)", x^2, "base", $\left(e^{a\sim x} - a\sim\right) e^{-\frac{e^{a\sim x}}{a\sim} + a\sim x + \frac{1}{a\sim}}$, "MuthRV(a)"

"f(x)", $\frac{1}{2} \frac{\left(e^{a\sim\sqrt{x}} - a\sim\right) e^{-\frac{-a\sim^2\sqrt{x} + e^{a\sim\sqrt{x}} - 1}{a\sim}}}{\sqrt{x}}$

"i is", 2,

" ----------"

$$g := t \to \sqrt{t}$$

$$l := 0$$

$$u := \infty$$

$$Temp := \left[\left[y\sim \to 2\left(e^{a\sim y\sim^2} - a\sim\right) e^{-\frac{-a\sim^2 y\sim^2 + e^{a\sim y\sim^2} - 1}{a\sim}} y\sim\right], [0, \infty], [\text{"Continuous"}, \text{"PDF"}]\right]$$

"l and u", 0, ∞

"g(x)", $\sqrt{x}$, "base", $\left(e^{a\sim x} - a\sim\right) e^{-\frac{e^{a\sim x}}{a\sim} + a\sim x + \frac{1}{a\sim}}$, "MuthRV(a)"

"f(x)", $2\left(e^{a\sim x^2} - a\sim\right) e^{-\frac{-a\sim^2 x^2 + e^{a\sim x^2} - 1}{a\sim}} x$

"i is", 3,

" ----------"

$$g := t \to \frac{1}{t}$$

$$l := 0$$

$$u := \infty$$

$$Temp := \left[\left[y\sim \to \frac{\left(e^{\frac{a\sim}{y\sim}} - a\sim\right) e^{-\frac{e^{\frac{a\sim}{y\sim}}\, y\sim - a\sim^2 - y\sim}{a\sim\, y\sim}}}{y\sim^2}\right], [0, \infty], ["Continuous", "PDF"]\right]$$

"l and u", 0, ∞

"g(x)", $\frac{1}{x}$, "base", $\left(e^{a\sim x} - a\sim\right) e^{-\frac{e^{a\sim x}}{a\sim} + a\sim x + \frac{1}{a\sim}}$, "MuthRV(a)"

"f(x)", $\frac{\left(e^{\frac{a\sim}{x}} - a\sim\right) e^{-\frac{e^{\frac{a\sim}{x}}\, x - a\sim^2 - x}{a\sim x}}}{x^2}$

"i is", 4,

" ----------"

$$g := t \to \arctan(t)$$

$$l := 0$$

$$u := \infty$$

$$Temp := \left[\left[y\sim \to \left(e^{a\sim \tan(y\sim)} - a\sim\right) e^{-\frac{-a\sim^2 \tan(y\sim) + e^{a\sim \tan(y\sim)} - 1}{a\sim}} \left(1 + \tan(y\sim)^2\right)\right], \left[0, \frac{1}{2}\pi\right], ["Continuous", "PDF"]\right]$$

"l and u", 0, ∞

"g(x)", $\arctan(x)$, "base", $\left(e^{a\sim x} - a\sim\right) e^{-\frac{e^{a\sim x}}{a\sim} + a\sim x + \frac{1}{a\sim}}$, "MuthRV(a)"

"f(x)", $\left(e^{a\sim \tan(x)} - a\sim\right) e^{-\frac{-a\sim^2 \tan(x) + e^{a\sim \tan(x)} - 1}{a\sim}} \left(1 + \tan(x)^2\right)$

"i is", 5,

" ----------"

$$g := t \to e^t$$

$$l := 0$$

$$u := \infty$$

$$Temp := \left[\left[y\sim \to \frac{e^{-\frac{y\sim^{a\sim} - 1}{a\sim}} \left(-y\sim^{a\sim} a\sim + y\sim^{2\, a\sim}\right)}{y\sim}\right], [1, \infty], ["Continuous", "PDF"]\right]$$

"l and u", 0, ∞

"g(x)", e^x, "base", $\left(e^{a\sim x} - a\sim\right) e^{-\frac{e^{a\sim x}}{a\sim} + a\sim x + \frac{1}{a\sim}}$, "MuthRV(a)"

$$\text{"f(x)"},\ \frac{e^{-\frac{x^{a\sim}-1}{a\sim}}\left(-x^{a\sim}a\sim+x^{2a\sim}\right)}{x}$$

"i is", 6,

" ----------"

$$g := t\to\ln(t)$$

$$l := 0$$

$$u := \infty$$

$$Temp := \left[\left[y\sim\to\left(e^{a\sim e^{y\sim}}-a\sim\right)e^{-\frac{-a\sim^2 e^{y\sim}-a\sim y\sim+e^{a\sim e^{y\sim}}-1}{a\sim}}\right],[-\infty,\infty],[\text{"Continuous"},\ \text{"PDF"}]\right]$$

$$\text{"l and u"},\ 0,\ \infty$$

$$\text{"g(x)"},\ \ln(x),\ \text{"base"},\ \left(e^{a\sim x}-a\sim\right)e^{-\frac{e^{a\sim x}}{a\sim}+a\sim x+\frac{1}{a\sim}},\ \text{"MuthRV(a)"}$$

$$\text{"f(x)"},\ \left(e^{a\sim e^{x}}-a\sim\right)e^{-\frac{-a\sim^2 e^{x}-a\sim x+e^{a\sim e^{x}}-1}{a\sim}}$$

"i is", 7,

" ----------"

$$g := t\to e^{-t}$$

$$l := 0$$

$$u := \infty$$

$$Temp := \left[\left[y\sim\to\frac{e^{-\frac{y\sim^{-a\sim}-1}{a\sim}}\left(-y\sim^{-a\sim}a\sim+y\sim^{-2a\sim}\right)}{y\sim}\right],[0,1],[\text{"Continuous"},\ \text{"PDF"}]\right]$$

$$\text{"l and u"},\ 0,\ \infty$$

$$\text{"g(x)"},\ e^{-x},\ \text{"base"},\ \left(e^{a\sim x}-a\sim\right)e^{-\frac{e^{a\sim x}}{a\sim}+a\sim x+\frac{1}{a\sim}},\ \text{"MuthRV(a)"}$$

$$\text{"f(x)"},\ \frac{e^{-\frac{x^{-a\sim}-1}{a\sim}}\left(-x^{-a\sim}a\sim+x^{-2a\sim}\right)}{x}$$

"i is", 8,

" ----------"

$$g := t\to -\ln(t)$$

$$l := 0$$

$$u := \infty$$

$$Temp := \left[\left[y\sim\to\left(e^{a\sim e^{-y\sim}}-a\sim\right)e^{-\frac{-a\sim^2 e^{-y\sim}+a\sim y\sim+e^{a\sim e^{-y\sim}}-1}{a\sim}}\right],[-\infty,\infty],[\text{"Continuous"},\ \text{"PDF"}]\right]$$

"PDF"]]

"l and u", 0, ∞

"g(x)", $-\ln(x)$, "base", $\left(e^{a\sim x}-a\sim\right)\ e^{-\frac{e^{a\sim x}}{a\sim}+a\sim x+\frac{1}{a\sim}}$, "MuthRV(a)"

"f(x)", $\left(e^{a\sim e^{-x}}-a\sim\right)\ e^{-\frac{-a\sim^2 e^{-x}+a\sim x+e^{a\sim e^{-x}}-1}{a\sim}}$

"i is", 9,

" ----------"

$$g := t\to\ln(t+1)$$

$$l := 0$$

$$u := \infty$$

$$Temp := \left[\left[y\sim\to\left(e^{a\sim\left(e^{y\sim}-1\right)}-a\sim\right)\ e^{-\frac{-a\sim^2 e^{y\sim}+a\sim^2-a\sim y\sim+e^{a\sim\left(e^{y\sim}-1\right)}-1}{a\sim}}\right],\ [0,\ \infty],\ ["Continuous",\ "PDF"]\right]$$

"l and u", 0, ∞

"g(x)", $\ln(x+1)$, "base", $\left(e^{a\sim x}-a\sim\right)\ e^{-\frac{e^{a\sim x}}{a\sim}+a\sim x+\frac{1}{a\sim}}$, "MuthRV(a)"

"f(x)", $\left(e^{a\sim\left(e^{x}-1\right)}-a\sim\right)\ e^{-\frac{-a\sim^2 e^{x}+a\sim^2-a\sim x+e^{a\sim\left(e^{x}-1\right)}-1}{a\sim}}$

"i is", 10,

" ----------"

$$g := t\to\frac{1}{\ln(t+2)}$$

$$l := 0$$

$$u := \infty$$

$$Temp := \left[\left[y\sim\to\frac{\left(e^{a\sim\left(e^{\frac{1}{y\sim}}-2\right)}-a\sim\right)\ e^{-\frac{-e^{\frac{1}{y\sim}}\ a\sim^2 y\sim+2\,a\sim^2 y\sim+e^{a\sim\left(e^{\frac{1}{y\sim}}-2\right)}y\sim-a\sim-y\sim}{a\sim y\sim}}}{y\sim^2}\right],\left[0,\ \frac{1}{\ln(2)}\right],\ ["Continuous",\ "PDF"]\right]$$

"l and u", 0, ∞

"g(x)", $\frac{1}{\ln(x+2)}$, "base", $\left(e^{a\sim x}-a\sim\right)\ e^{-\frac{e^{a\sim x}}{a\sim}+a\sim x+\frac{1}{a\sim}}$, "MuthRV(a)"

$$\text{"f(x)"},\ \frac{\left(e^{a\sim\left(e^{\frac{1}{x}}-2\right)}-a\sim\right)\ e^{-\frac{-e^{\frac{1}{x}}\ a\sim^2 x+2\,a\sim^2 x+e^{a\sim\left(e^{\frac{1}{x}}-2\right)}x-a\sim-x}{a\sim x}}}{x^2}$$

"i is", 11,

" ----------"

$$g := t\to\tanh(t)$$

$$l := 0$$

$$u := \infty$$

$$Temp := \left[\left[y\sim\to -\frac{\left(e^{a\sim\operatorname{arctanh}(y\sim)}-a\sim\right)\ e^{-\frac{-a\sim^2\operatorname{arctanh}(y\sim)+e^{a\sim\operatorname{arctanh}(y\sim)}-1}{a\sim}}}{y\sim^2-1}\right],\ [0,\ 1\,],\right.$$

$$\left.[\text{"Continuous"},\ \text{"PDF"}]\right]$$

$$\text{"l and u"},\ 0,\ \infty$$

$$\text{"g(x)"},\ \tanh(x),\ \text{"base"},\ \left(e^{a\sim x}-a\sim\right)\ e^{-\frac{e^{a\sim x}}{a\sim}+a\sim x+\frac{1}{a\sim}},\ \text{"MuthRV(a)"}$$

$$\text{"f(x)"},\ -\frac{\left(e^{a\sim\operatorname{arctanh}(x)}-a\sim\right)\ e^{-\frac{-a\sim^2\operatorname{arctanh}(x)+e^{a\sim\operatorname{arctanh}(x)}-1}{a\sim}}}{x^2-1}$$

"i is", 12,

" ----------"

$$g := t\to\sinh(t)$$

$$l := 0$$

$$u := \infty$$

$$Temp := \left[\left[y\sim\to \frac{\left(e^{a\sim\operatorname{arcsinh}(y\sim)}-a\sim\right)\ e^{-\frac{-a\sim^2\operatorname{arcsinh}(y\sim)+e^{a\sim\operatorname{arcsinh}(y\sim)}-1}{a\sim}}}{\sqrt{y\sim^2+1}}\right],\ [0,\ \infty\,],\right.$$

$$\left.[\text{"Continuous"},\ \text{"PDF"}]\right]$$

$$\text{"l and u"},\ 0,\ \infty$$

$$\text{"g(x)"},\ \sinh(x),\ \text{"base"},\ \left(e^{a\sim x}-a\sim\right)\ e^{-\frac{e^{a\sim x}}{a\sim}+a\sim x+\frac{1}{a\sim}},\ \text{"MuthRV(a)"}$$

$$\text{"f(x)"},\ \frac{\left(e^{a\sim\operatorname{arcsinh}(x)}-a\sim\right)\ e^{-\frac{-a\sim^2\operatorname{arcsinh}(x)+e^{a\sim\operatorname{arcsinh}(x)}-1}{a\sim}}}{\sqrt{x^2+1}}$$

"i is", 13,

" ----------"

$$g := t \to \operatorname{arcsinh}(t)$$

$$l := 0$$

$$u := \infty$$

$$Temp := \left[\left[y\sim \to \left(e^{a\sim \sinh(y\sim)} - a\sim\right) e^{-\frac{-a\sim^2 \sinh(y\sim) + e^{a\sim \sinh(y\sim)} - 1}{a\sim}} \cosh(y\sim)\right], [0, \infty], \right.$$

$$\left.["\text{Continuous}", "\text{PDF}"]\right]$$

"l and u", 0, ∞

"g(x)", $\operatorname{arcsinh}(x)$, "base", $\left(e^{a\sim x} - a\sim\right) e^{-\frac{e^{a\sim x}}{a\sim} + a\sim x + \frac{1}{a\sim}}$, "MuthRV(a)"

"f(x)", $\left(e^{a\sim \sinh(x)} - a\sim\right) e^{-\frac{-a\sim^2 \sinh(x) + e^{a\sim \sinh(x)} - 1}{a\sim}} \cosh(x)$

"i is", 14,

" ----------"

$$g := t \to \operatorname{csch}(t + 1)$$

$$l := 0$$

$$u := \infty$$

$$Temp := \left[\left[y\sim \to \frac{\left(e^{a\sim (-1 + \operatorname{arccsch}(y\sim))} - a\sim\right) e^{-\frac{-a\sim^2 \operatorname{arccsch}(y\sim) + a\sim^2 + e^{a\sim (-1 + \operatorname{arccsch}(y\sim))} - 1}{a\sim}}}{\sqrt{y\sim^2 + 1}\ |y\sim|}\right],\right.$$

$$\left.\left[0, \frac{2}{e - e^{-1}}\right], ["\text{Continuous}", "\text{PDF}"]\right]$$

"l and u", 0, ∞

"g(x)", $\operatorname{csch}(x + 1)$, "base", $\left(e^{a\sim x} - a\sim\right) e^{-\frac{e^{a\sim x}}{a\sim} + a\sim x + \frac{1}{a\sim}}$, "MuthRV(a)"

"f(x)", $\frac{\left(e^{a\sim (-1 + \operatorname{arccsch}(x))} - a\sim\right) e^{-\frac{-a\sim^2 \operatorname{arccsch}(x) + a\sim^2 + e^{a\sim (-1 + \operatorname{arccsch}(x))} - 1}{a\sim}}}{\sqrt{x^2 + 1}\ |x|}$

"i is", 15,

" ----------"

$$g := t \to \operatorname{arccsch}(t + 1)$$

$$l := 0$$

$$u := \infty$$

$$Temp := \left[\left[y\sim \rightarrow \frac{1}{\sinh(y\sim)^2}\left(\left(e^{-\frac{a\sim(\sinh(y\sim)-1)}{\sinh(y\sim)}} - a\sim\right) e^{-\frac{a\sim^2\sinh(y\sim)+e^{-\frac{a\sim(\sinh(y\sim)-1)}{\sinh(y\sim)}}\sinh(y\sim)-a\sim^2-\sinh(y\sim)}{\sinh(y\sim)\,a\sim}}\cosh(y\sim)\right)\right], [0, \ln(1+\sqrt{2})]\right], ["Continuous", "PDF"]\right]$$

"l and u", 0, ∞

"g(x)", $\operatorname{arccsch}(x+1)$, "base", $\left(e^{a\sim x} - a\sim\right) e^{-\frac{e^{a\sim x}}{a\sim} + a\sim x + \frac{1}{a\sim}}$, "MuthRV(a)"

"f(x)", $\frac{\left(e^{-\frac{a\sim(\sinh(x)-1)}{\sinh(x)}} - a\sim\right) e^{-\frac{a\sim^2\sinh(x)+e^{-\frac{a\sim(\sinh(x)-1)}{\sinh(x)}}\sinh(x)-a\sim^2-\sinh(x)}{\sinh(x)\,a\sim}}\cosh(x)}{\sinh(x)^2}$

"i is", 16,

" ----------"

$$g := t \rightarrow \frac{1}{\tanh(t+1)}$$

$$l := 0$$

$$u := \infty$$

$$Temp := \left[\left[y\sim \rightarrow \frac{\left(e^{a\sim\left(-1+\operatorname{arctanh}\left(\frac{1}{y\sim}\right)\right)} - a\sim\right) e^{-\frac{-a\sim^2\operatorname{arctanh}\left(\frac{1}{y\sim}\right)+a\sim^2+e^{a\sim\left(-1+\operatorname{arctanh}\left(\frac{1}{y\sim}\right)\right)}-1}{a\sim}}}{y\sim^2-1}\right], \left[1, \frac{e+e^{-1}}{e-e^{-1}}\right]\right], ["Continuous", "PDF"]\right]$$

"l and u", 0, ∞

"g(x)", $\frac{1}{\tanh(x+1)}$, "base", $\left(e^{a\sim x}-a\sim\right)\ e^{-\frac{e^{a\sim x}}{a\sim}+a\sim x+\frac{1}{a\sim}}$, "MuthRV(a)"

"f(x)", $\frac{\left(e^{a\sim\left(-1+\operatorname{arctanh}\left(\frac{1}{x}\right)\right)}-a\sim\right)\ e^{-\frac{-a\sim^2\operatorname{arctanh}\left(\frac{1}{x}\right)+a\sim^2+e^{a\sim\left(-1+\operatorname{arctanh}\left(\frac{1}{x}\right)\right)}-1}{a\sim}}}{x^2-1}$

"i is", 17,

" ----------"

$$g := t \to \frac{1}{\sinh(t+1)}$$

$$l := 0$$

$$u := \infty$$

$$Temp := \left[\left[\left[y\sim \to \frac{\left(e^{a\sim\left(-1+\operatorname{arcsinh}\left(\frac{1}{y\sim}\right)\right)}-a\sim\right)\ e^{-\frac{-a\sim^2\operatorname{arcsinh}\left(\frac{1}{y\sim}\right)+a\sim^2+e^{a\sim\left(-1+\operatorname{arcsinh}\left(\frac{1}{y\sim}\right)\right)}-1}{a\sim}}}{\sqrt{y\sim^2+1}\ |y\sim|}\right], \left[0, \frac{2}{e-e^{-1}}\right], \left["Continuous", "PDF"\right]\right]$$

"l and u", 0, ∞

"g(x)", $\frac{1}{\sinh(x+1)}$, "base", $\left(e^{a\sim x}-a\sim\right)\ e^{-\frac{e^{a\sim x}}{a\sim}+a\sim x+\frac{1}{a\sim}}$, "MuthRV(a)"

"f(x)", $\frac{\left(e^{a\sim\left(-1+\operatorname{arcsinh}\left(\frac{1}{x}\right)\right)}-a\sim\right)\ e^{-\frac{-a\sim^2\operatorname{arcsinh}\left(\frac{1}{x}\right)+a\sim^2+e^{a\sim\left(-1+\operatorname{arcsinh}\left(\frac{1}{x}\right)\right)}-1}{a\sim}}}{\sqrt{x^2+1}\ |x|}$

"i is", 18,

" ----------"

$$g := t \to \frac{1}{\operatorname{arcsinh}(t+1)}$$

$$l := 0$$

$$u := \infty$$

$$Temp := \left[\left[y\sim \rightarrow \frac{\left(e^{a\sim\left(-1+\sinh\left(\frac{1}{y\sim}\right)\right)} - a\sim\right) e^{-\frac{-a\sim^2 \sinh\left(\frac{1}{y\sim}\right) + a\sim^2 + e^{a\sim\left(-1+\sinh\left(\frac{1}{y\sim}\right)\right)} - 1}{a\sim}} \cosh\left(\frac{1}{y\sim}\right)}{y\sim^2}\right], \left[0, \frac{1}{\ln\left(1+\sqrt{2}\right)}\right], \left["Continuous", "PDF"\right]\right]$$

"l and u", 0, ∞

"g(x)", $\frac{1}{\operatorname{arcsinh}(x+1)}$, "base", $\left(e^{a\sim x} - a\sim\right) e^{-\frac{e^{a\sim x}}{a\sim} + a\sim x + \frac{1}{a\sim}}$, "MuthRV(a)"

"f(x)", $\frac{\left(e^{a\sim\left(-1+\sinh\left(\frac{1}{x}\right)\right)} - a\sim\right) e^{-\frac{-a\sim^2 \sinh\left(\frac{1}{x}\right) + a\sim^2 + e^{a\sim\left(-1+\sinh\left(\frac{1}{x}\right)\right)} - 1}{a\sim}} \cosh\left(\frac{1}{x}\right)}{x^2}$

"i is", 19,

" ----------"

$$g := t \rightarrow \frac{1}{\operatorname{csch}(t)} + 1$$

$$l := 0$$

$$u := \infty$$

$$Temp := \left[\left[y\sim \rightarrow \frac{\left(e^{a\sim \operatorname{arccsch}\left(\frac{1}{y\sim-1}\right)} - a\sim\right) e^{-\frac{-a\sim^2 \operatorname{arccsch}\left(\frac{1}{y\sim-1}\right) + e^{a\sim \operatorname{arccsch}\left(\frac{1}{y\sim-1}\right)} - 1}{a\sim}}}{\sqrt{y\sim^2 - 2\,y\sim + 2}}\right], [1, \infty], \left["Continuous", "PDF"\right]\right]$$

"l and u", 0, ∞

$$\text{"g(x)"},\ \frac{1}{\operatorname{csch}(x)}+1,\ \text{"base"},\ \left(e^{a\sim x}-a\sim\right)\ e^{-\frac{e^{a\sim x}}{a\sim}+a\sim x+\frac{1}{a\sim}},\ \text{"MuthRV(a)"}$$

$$\text{"f(x)"},\ \frac{\left(e^{a\sim \operatorname{arccsch}\left(\frac{1}{x-1}\right)}-a\sim\right)\ e^{-\frac{-a\sim^2 \operatorname{arccsch}\left(\frac{1}{x-1}\right)+e^{a\sim \operatorname{arccsch}\left(\frac{1}{x-1}\right)}-1}{a\sim}}}{\sqrt{x^2-2x+2}}$$

"i is", 20,

" ----------"

$$g := t\to \tanh\left(\frac{1}{t}\right)$$

$$l := 0$$

$$u := \infty$$

$$Temp := \left[\left[y\sim\to -\frac{\left(e^{\frac{a\sim}{\operatorname{arctanh}(y\sim)}}-a\sim\right)\ e^{-\frac{e^{\frac{a\sim}{\operatorname{arctanh}(y\sim)}}\operatorname{arctanh}(y\sim)-a\sim^2-\operatorname{arctanh}(y\sim)}{a\sim \operatorname{arctanh}(y\sim)}}}{\operatorname{arctanh}(y\sim)^2\left(y\sim^2-1\right)}\right],[0,1],\right.$$

$$\left.[\text{"Continuous"},\ \text{"PDF"}]\right]$$

$$\text{"l and u"},\ 0,\ \infty$$

$$\text{"g(x)"},\ \tanh\left(\frac{1}{x}\right),\ \text{"base"},\ \left(e^{a\sim x}-a\sim\right)\ e^{-\frac{e^{a\sim x}}{a\sim}+a\sim x+\frac{1}{a\sim}},\ \text{"MuthRV(a)"}$$

$$\text{"f(x)"},\ -\frac{\left(e^{\frac{a\sim}{\operatorname{arctanh}(x)}}-a\sim\right)\ e^{-\frac{e^{\frac{a\sim}{\operatorname{arctanh}(x)}}\operatorname{arctanh}(x)-a\sim^2-\operatorname{arctanh}(x)}{a\sim \operatorname{arctanh}(x)}}}{\operatorname{arctanh}(x)^2\left(x^2-1\right)}$$

"i is", 21,

" ----------"

$$g := t\to \operatorname{csch}\left(\frac{1}{t}\right)$$

$$l := 0$$

$$u := \infty$$

$$Temp := \left[\left[y\sim\to \frac{\left(e^{\frac{a\sim}{\operatorname{arccsch}(y\sim)}}-a\sim\right)\ e^{-\frac{e^{\frac{a\sim}{\operatorname{arccsch}(y\sim)}}\operatorname{arccsch}(y\sim)-a\sim^2-\operatorname{arccsch}(y\sim)}{a\sim \operatorname{arccsch}(y\sim)}}}{\sqrt{y\sim^2+1}\ \operatorname{arccsch}(y\sim)^2\,|y\sim|}\right],[0,\infty],\right.$$

$$\left["Continuous", "PDF"]\right]$$

$$"l \text{ and } u", 0, \infty$$

$$"g(x)", \operatorname{csch}\left(\frac{1}{x}\right), "base", \left(e^{a\sim x} - a\sim\right) e^{-\frac{e^{a\sim x}}{a\sim} + a\sim x + \frac{1}{a\sim}}, "MuthRV(a)"$$

$$"f(x)", \frac{\left(e^{\frac{a\sim}{\operatorname{arccsch}(x)}} - a\sim\right) e^{-\frac{e^{\frac{a\sim}{\operatorname{arccsch}(x)}} \operatorname{arccsch}(x) - a\sim^2 - \operatorname{arccsch}(x)}{a\sim \operatorname{arccsch}(x)}}}{\sqrt{x^2+1}\ \operatorname{arccsch}(x)^2\ |x|}$$

"i is", 22,

" ----------"

$$g := t \to \operatorname{arccsch}\left(\frac{1}{t}\right)$$

$$l := 0$$

$$u := \infty$$

$$Temp := \left[\left[y\sim \to \left(e^{a\sim \sinh(y\sim)} - a\sim\right) e^{-\frac{-a\sim^2 \sinh(y\sim) + e^{a\sim \sinh(y\sim)} - 1}{a\sim}} \cosh(y\sim)\right], [0, \infty],\right.$$

$$\left.["Continuous", "PDF"]\right]$$

$$"l \text{ and } u", 0, \infty$$

$$"g(x)", \operatorname{arccsch}\left(\frac{1}{x}\right), "base", \left(e^{a\sim x} - a\sim\right) e^{-\frac{e^{a\sim x}}{a\sim} + a\sim x + \frac{1}{a\sim}}, "MuthRV(a)"$$

$$"f(x)", \left(e^{a\sim \sinh(x)} - a\sim\right) e^{-\frac{-a\sim^2 \sinh(x) + e^{a\sim \sinh(x)} - 1}{a\sim}} \cosh(x) \qquad \textbf{(3)}$$