```
> 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 := ArcSinRV();
  bfname := "ArcSinRV()";
```

$$bf := \left[\left[x \to \frac{1}{\pi \sqrt{x\,(1-x)}}\right], [0, 1], ["\text{Continuous}", "\text{PDF}"]\right]$$

$$bfname := \text{"ArcSinRV()"} \tag{1}$$

```
> #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);
```

$$-\ln(y) \tag{2}$$

```
> # discarded  -ln(t + 1),  t-> csch(t),t->arccsch(t),t -> tan(t),
> #name of the file for latex output
  filename := "C:/LatexOutput/ArcSin.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, "  ----------------------------------------
----------------------------------------------------------------
-------------");
if i < 15 or i > 15 then

   g := glist[i]:
   l := 0;
   u := infinity;
   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));
  if i <>14 and i <> 21 then
  print("F(x)", CDF(Temp, x));
  if i <> 11 and i <> 17 and i <> 19 then print("IDF(x)", IDF
(Temp)) end if;
  print("S(x)", SF(Temp, x));
  print("h(x)", HF(Temp, x));
  print("mean and variance", Mean(Temp), Variance(Temp));
  assume(r > 0); mf := int(x^r*PDF(Temp, x), x = Temp[2][1] ..
Temp[2][2]):
  print("MF", mf);
  print("MGF", MGF(Temp));
  if i <>17 then
  PlotDist(PDF(Temp), 0, 40);
  PlotDist(HF(Temp), 0, 40);
  end if;
  latex(PDF(Temp,x));
  #print("transforming with", [[x->g(x)],[0,infinity]]);
  #X2 := Transform(bf, [[x->g(x)],[0,infinity]]);
  #print("pdf of X2 = ", PDF(X2,x));
  #print("pdf of Temp = ", PDF(Temp,x));

  end if;

  #latex output
  appendto(filename);
  printf("----------------------------------------------------------
-----------------------------------  \\\\");
  printf("$$");
  latex(glist[i]);
  printf("$$");
  printf("Probability Distribution Function \n$$  f(x)=");
  latex(PDF(Temp,x));
  printf("$$");
  if i <>14 and i <> 21 then
```

```
    printf("Cumulative Distribution Function  \n $$F(x)=");
    latex(CDF(Temp,x));
    printf("$$");
    printf(" Inverse Cumulative Distribution Function \n ");
    printf(" $$F^{-1} = ");
    if i <> 11 and i <> 17 and i <> 19 then latex(IDF(Temp)[1])end
  if;
    printf("$$");
    printf("Survivor Function \n $$ S(x)=");
    latex(SF(Temp, x));
    printf("$$ Hazard Function \n $$ h(x)=");
    latex(HF(Temp,x));
    printf("$$ Mean \n $$ \mu=");
    latex(Mean(Temp));
    printf("$$ Variance \n $$ \sigma^2 = ");
    latex(Variance(Temp));
    printf("$$ Moment Function \n $$ m(x) = ");
    latex(mf);
    printf("$$ Moment Generating Function \n $$");
    latex(MGF(Temp)[1]);
    printf("$$");
    #latex(MGF(Temp)[1];
    end if;

    writeto(terminal);

  end if;

  od;

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

$$filename := \text{"C:/LatexOutput/ArcSin.tex"}$$

$$\frac{1}{\pi \sqrt{x\,(1-x)}}$$

"i is", 1,

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

"l and u", 0, ∞

"g(x)", x^2, "base", $\frac{1}{\pi \sqrt{x\,(1-x)}}$, "ArcSinRV()"

"f(x)", $\frac{1}{2\sqrt{-\sqrt{x}\,\left(-1+\sqrt{x}\right)}\,\sqrt{x}\,\pi}$

"F(x)", $\left\{ \frac{I\sqrt{x}\sqrt{1-\sqrt{x}}\sqrt{-1+\sqrt{x}}\ln(2)+\sqrt{x}\sqrt{1-\sqrt{x}}\sqrt{-1+\sqrt{x}}\pi-\sqrt{x}\ln\left(-1+2\sqrt{x}+2x^{1/4}\sqrt{\right.}\right.$

$\left. \frac{\sqrt{x}\sqrt{1-\sqrt{x}}\sqrt{-1+\sqrt{x}}}{I\left(-Ix\pi+I\sqrt{x}\pi+\sqrt{x}\ln\left(-1+2\sqrt{x}+2x^{1/4}\sqrt{-1+\sqrt{x}}\right)-\right.} \right.$

$\left. \frac{}{\sqrt{x}\left(-1+\sqrt{x}\right)\pi} \right\}$

"IDF(x)", [[ ], [0, 1], ["Continuous", "IDF"]]

"S(x)", $\left\{ \frac{-I\ln(2)\sqrt{x}\sqrt{-1+\sqrt{x}}\sqrt{1-\sqrt{x}}-\sqrt{x}\ln(2)+x\ln(2)+\sqrt{x}\ln\left(-1+2\sqrt{x}+2x^{1/4}\sqrt{-1+\sqrt{}}\right.\right.$

$\left. \frac{}{\sqrt{x}\sqrt{1-\sqrt{x}}\sqrt{-1+\sqrt{x}}\pi} \right.$

$\left. -\frac{I\ln\left(-1+2\sqrt{x}+2x^{1/4}\sqrt{-1+\sqrt{x}}\right)(\sqrt{x}-x)}{\sqrt{x}\left(-1+\sqrt{x}\right)\pi} \right\}$

"h(x)", $\left\{ -\frac{1}{2}\frac{\sqrt{1-\sqrt{x}}\sqrt{-1+\sqrt{x}}}{\sqrt{-\sqrt{x}\left(-1+\sqrt{x}\right)}\left(I\sqrt{x}\sqrt{1-\sqrt{x}}\sqrt{-1+\sqrt{x}}\ln(2)+\sqrt{x}\ln(2)-x\ln(2)-\sqrt{x}\ln\left(-1-\right.\right.}\right.$

$\left. \frac{1}{2}\frac{\sqrt{-1+\sqrt{x}}}{x^{1/4}\ln\left(-1+2\sqrt{x}+2x^{1/4}\sqrt{-1+\sqrt{x}}\right.} \right\}$

"mean and variance", $\frac{3}{8}, \frac{17}{128}$

"MF", $\frac{2\,\Gamma\left(\frac{3}{2}+2\,r\sim\right)}{\sqrt{\pi}\,(4\,r\sim+1)\,\Gamma(2\,r\sim+1)}$

"MGF", $\text{hypergeom}\left(\left[\frac{1}{4}, \frac{3}{4}\right], \left[\frac{1}{2}, 1\right], t\right)$

WARNING(PlotDist): High value provided by user, 40 *is greater than maximum support value of the random variable*, 1

Resetting high to RV's maximum support value

WARNING(PlotDist): High value provided by user, 40 *is greater than maximum support value of the random variable*, 1

Resetting high to RV's maximum support value

```
1/2\,{\frac {1}{\sqrt {-\sqrt {x} \left( -1+\sqrt {x} \right) }
\sqrt {
x}\pi}}
```

"i is", 2,

" ----------

---------- "

"l and u", 0, ∞

$$\text{"g(x)"}, \sqrt{x}, \text{"base"}, \frac{1}{\pi\sqrt{(1-x)\,x}}, \text{"ArcSinRV()"}$$

$$\text{"f(x)"}, \frac{2\,\text{signum}(x)}{\sqrt{-x^2+1}\;\pi}$$

$$\text{"F(x)"}, \frac{2\arcsin(x)}{\pi}$$

$$\text{"IDF(x)"}, \left[\left[s \to \sin\left(\frac{1}{2}\,s\,\pi\right)\right], [0, 1], [\text{"Continuous"}, \text{"IDF"}]\right]$$

$$\text{"S(x)"}, 1 - \frac{2\arcsin(x)}{\pi}$$

$$\text{"h(x)"}, \frac{2\,\text{signum}(x)}{\sqrt{-x^2+1}\;(\pi - 2\arcsin(x))}$$

$$\text{"mean and variance"}, \frac{2}{\pi}, \frac{1}{2} - \frac{4}{\pi^2}$$

$$\text{"MF"}, \frac{2\,\Gamma\left(\frac{3}{2} + \frac{1}{2}\,r\sim\right)}{\sqrt{\pi}\;(1+r\sim)\,\Gamma\left(1 + \frac{1}{2}\,r\sim\right)}$$

$$\text{"MGF"}, \text{BesselI}(0, t) + \text{StruveL}(0, t)$$

WARNING(PlotDist): High value provided by user, 40 *is greater than maximum support value of the random variable*, 1

Resetting high to RV's maximum support value

WARNING(PlotDist): High value provided by user, 40 *is greater than maximum support value of the random variable*, 1

Resetting high to RV's maximum support value

```
2\,{\frac {{\it signum} \left( x \right) }{\sqrt {-{x}^{2}+1}
\pi}}
```

"i is", 3,

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

"l and u", 0, ∞

$$\text{"g(x)"}, \frac{1}{x}, \text{"base"}, \frac{1}{\pi\sqrt{(1-x)\,x}}, \text{"ArcSinRV()"}$$

$$\text{"f(x)"}, \frac{1}{\sqrt{x-1}\;\pi\,|x|}$$

$$\text{"F(x)"}, \frac{2\arctan\left(\sqrt{x-1}\right)}{\pi}$$

$$\text{"IDF(x)"}, \left[\left[s \to \frac{1}{\cos\left(\frac{1}{2}\, s\, \pi\right)^2} \right], [0, 1], [\text{"Continuous"}, \text{"IDF"}]\right]$$

$$\text{"S(x)"}, \frac{\pi - 2\arctan\left(\sqrt{x-1}\right)}{\pi}$$

$$\text{"h(x)"}, \frac{1}{\sqrt{x-1}\ |x|\ \left(\pi - 2\arctan\left(\sqrt{x-1}\right)\right)}$$

$$\text{"mean and variance"}, \infty, \textit{undefined}$$

$$\text{"MF"}, \int_1^{\infty} \frac{x^{r\sim}}{\sqrt{x-1}\ \pi\ |x|}\, dx$$

$$\text{"MGF"}, -\frac{\sqrt{-t}\ \operatorname{erfi}\left(\sqrt{t}\right) - \sqrt{t}}{\sqrt{t}}$$

WARNING(PlotDist): Low value provided by user, 0
is less than minimum support value of random variable
1
Resetting low to RV's minimum support value
WARNING(PlotDist): Low value provided by user, 0
is less than minimum support value of random variable
1
Resetting low to RV's minimum support value

```
{\frac {1}{\sqrt {x-1}\pi\, \left| x \right| }}
```

"i is", 4,
" ----------"

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

$$\text{"g(x)"}, \arctan(x), \text{"base"}, \frac{1}{\pi\sqrt{x\ (1-x)}}, \text{"ArcSinRV()"}$$

$$\text{"f(x)"}, \frac{1 + \tan(x)^2}{\pi\sqrt{-\tan(x)\ (-1 + \tan(x))}}$$

$$\text{"F(x)"}, \begin{cases} \frac{1}{2}\ \frac{\pi + 2\arcsin(-1 + 2\tan(x))}{\pi} & x \le \frac{1}{2}\,\pi \\ \frac{1}{2}\ \frac{-\infty\, I + \pi + 2\,\Re(\arcsin(-1 + 2\tan(x)))}{\pi} & \frac{1}{2}\,\pi < x \end{cases}$$

$$\text{"IDF(x)"}, [[\ ]], [0, 1], [\text{"Continuous"}, \text{"IDF"}]]$$

$$\text{"S(x)"}, \begin{cases} \frac{1}{2}\ \frac{\pi - 2\arcsin(-1+2\tan(x))}{\pi} & x \le \frac{1}{2}\pi \\ \frac{1}{2}\ \frac{\infty\, I + \pi - 2\,\Re(\arcsin(-1+2\tan(x)))}{\pi} & \frac{1}{2}\pi < x \end{cases}$$

$$\text{"h(x)"}, \begin{cases} \frac{2\left(1+\tan(x)^2\right)}{\sqrt{-\tan(x)\ (-1+\tan(x))}\ \left(\pi - 2\arcsin(-1+2\tan(x))\right)} & x \le \frac{1}{2}\pi \\ 0 & \frac{1}{2}\pi < x \end{cases}$$

$$\text{"mean and variance"}, \frac{\int_0^{\frac{1}{4}\pi} \frac{x}{\cos(x)\sqrt{\sin(x)}\ \sqrt{\cos(x)-\sin(x)}}\,dx}{\pi}, \frac{1}{\pi^2}\left(\left(\int_0^{\frac{1}{4}\pi} \frac{x^2}{\cos(x)\sqrt{\sin(x)}\ \sqrt{\cos(x)-\sin(x)}}\,dx\right)\pi - \left(\int_0^{\frac{1}{4}\pi} \frac{x}{\cos(x)\sqrt{\sin(x)}\ \sqrt{\cos(x)-\sin(x)}}\,dx\right)^2\right)$$

$$\text{"MF"}, \int_0^{\frac{1}{4}\pi} \frac{x^{r\sim}\left(1+\tan(x)^2\right)}{\pi\sqrt{-\tan(x)\ (-1+\tan(x))}}\,dx$$

$$\text{"MGF"}, \frac{\int_0^{\frac{1}{4}\pi} \frac{e^{tx}}{\cos(x)\sqrt{\sin(x)}\ \sqrt{\cos(x)-\sin(x)}}\,dx}{\pi}$$

WARNING(PlotDist): High value provided by user, 40 *is greater than maximum support value of the random variable,* $\frac{1}{4}\pi$

Resetting high to RV's maximum support value

WARNING(PlotDist): High value provided by user, 40 *is greater than maximum support value of the random variable,* $\frac{1}{4}\pi$

Resetting high to RV's maximum support value

```
{\frac {1+ \left( \tan \left( x \right)  \right) ^{2}}{\pi\,
\sqrt {-
\tan \left( x \right)  \left( -1+\tan \left( x \right)  \right)
}}}
```

"i is", 5,

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

"l and u", 0, ∞

"g(x)", e^{x}, "base", $\frac{1}{\pi \sqrt{x\,(1-x)}}$, "ArcSinRV()"

"f(x)", $\frac{1}{\pi \sqrt{-\ln(x)\,(-1+\ln(x))}\,x}$

"F(x)", $\frac{1}{2}\,\frac{\pi+2\arcsin(-1+2\ln(x))}{\pi}$

"IDF(x)", $\left[\left[s \to e^{-\frac{1}{2}\cos(s\pi)+\frac{1}{2}}\right], [0, 1], ["Continuous", "IDF"]\right]$

"S(x)", $\frac{1}{2}\,\frac{\pi-2\arcsin(-1+2\ln(x))}{\pi}$

"h(x)", $\frac{2}{\sqrt{-\ln(x)\,(-1+\ln(x))}\,x\,(\pi-2\arcsin(-1+2\ln(x)))}$

"mean and variance", $\frac{\int_1^e \frac{1}{\sqrt{1-\ln(x)}\,\sqrt{\ln(x)}}\,dx}{\pi}$,

$$\frac{\left(\int_1^e \frac{x}{\sqrt{1-\ln(x)}\,\sqrt{\ln(x)}}\,dx\right)\pi-\left(\int_1^e \frac{1}{\sqrt{1-\ln(x)}\,\sqrt{\ln(x)}}\,dx\right)^2}{\pi^2}$$

"MF", $\int_1^e \frac{x^{r\sim}}{\pi \sqrt{-\ln(x)\,(-1+\ln(x))}\,x}\,dx$

"MGF", $\frac{\int_1^e \frac{e^{t\,x}}{\sqrt{1-\ln(x)}\,\sqrt{\ln(x)}\,x}\,dx}{\pi}$

WARNING(PlotDist): Low value provided by user, 0
is less than minimum support value of random variable
1

Resetting low to RV's minimum support value

WARNING(PlotDist): High value provided by user, 40

is greater than maximum support value of the random variable,e

Resetting high to RV's maximum support value

WARNING(PlotDist): Low value provided by user, 0 *is less than minimum support value of random variable*

1

Resetting low to RV's minimum support value

WARNING(PlotDist): High value provided by user, 40 *is greater than maximum support value of the random variable*,e

Resetting high to RV's maximum support value

```
{\frac {1}{\pi\,\sqrt {-\ln  \left( x \right)  \left( -1+\ln \left( x
 \right)  \right) }x}}
```

"i is", 6,

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

"l and u", 0, ∞

"g(x)", $\ln(x)$, "base", $\frac{1}{\pi\sqrt{x\,(1-x)}}$, "ArcSinRV()"

"f(x)", $\frac{e^{\frac{1}{2}x}}{\sqrt{1-e^{x}}\,\pi}$

"F(x)", $\frac{1}{2}\,\frac{\pi+2\arcsin\left(2\,e^{x}-1\right)}{\pi}$

"IDF(x)", $[[s\to -\ln(2)+\ln(-\cos(s\,\pi)+1)]$, $[0, 1]$, ["Continuous", "IDF"]]

"S(x)", $\frac{1}{2}\,\frac{\pi-2\arcsin\left(2\,e^{x}-1\right)}{\pi}$

"h(x)", $\frac{2\,e^{\frac{1}{2}x}}{\sqrt{1-e^{x}}\,\left(\pi-2\arcsin\left(2\,e^{x}-1\right)\right)}$

"mean and variance", $\int_{-\infty}^{0}\frac{x\,e^{\frac{1}{2}x}}{\sqrt{1-e^{x}}\,\pi}\,dx$, $\int_{-\infty}^{0}\frac{x^{2}\,e^{\frac{1}{2}x}}{\sqrt{1-e^{x}}\,\pi}\,dx-\left(\int_{-\infty}^{0}\frac{x\,e^{\frac{1}{2}x}}{\sqrt{1-e^{x}}\,\pi}\,dx\right)^{2}$

"MF", $\int_{-\infty}^{0}\frac{x^{r\sim}\,e^{\frac{1}{2}x}}{\sqrt{1-e^{x}}\,\pi}\,dx$

$$\text{"MGF"}, \int_{-\infty}^{0} \frac{e^{\frac{1}{2}x(2t+1)}}{\sqrt{1-e^{x}}\,\pi}\,dx$$

WARNING(PlotDist): High value provided by user, 40 *is greater than maximum support value of the random variable*, 0

Resetting high to RV's maximum support value

Warning, unable to evaluate the function to numeric values in the region; see the plotting command's help page to ensure the calling sequence is correct

WARNING(PlotDist): High value provided by user, 40 *is greater than maximum support value of the random variable*, 0

Resetting high to RV's maximum support value

Warning, unable to evaluate the function to numeric values in the region; see the plotting command's help page to ensure the calling sequence is correct

```
{\frac {{{\rm e}^{x/2}}}{\sqrt {1-{{\rm e}^{x}}}\pi}}
```

"i is", 7,

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

"l and u", 0, ∞

$$\text{"g(x)"}, e^{-x}, \text{"base"}, \frac{1}{\pi\sqrt{x\,(1-x)}}, \text{"ArcSinRV()"}$$

$$\text{"f(x)"}, \frac{1}{\pi\sqrt{-\ln(x)\,(1+\ln(x))}\,x}$$

$$\text{"F(x)"}, \frac{1}{2}\,\frac{\pi+2\arcsin(1+2\ln(x))}{\pi}$$

$$\text{"IDF(x)"}, \left[\left[s \to e^{-\frac{1}{2}\cos(s\pi)-\frac{1}{2}}\right], [0,1], [\text{"Continuous"}, \text{"IDF"}]\right]$$

$$\text{"S(x)"}, \frac{1}{2}\,\frac{\pi-2\arcsin(1+2\ln(x))}{\pi}$$

$$\text{"h(x)"}, \frac{2}{\sqrt{-\ln(x)\,(1+\ln(x))}\,x\,(\pi-2\arcsin(1+2\ln(x)))}$$

$$\text{"mean and variance"}, e^{-\frac{1}{2}}\,\text{BesselI}\left(0, \frac{1}{2}\right), -e^{-1}\left(\text{BesselI}\left(0, \frac{1}{2}\right)^2-\text{BesselI}(0,1)\right)$$

$$\text{"MF"}, e^{-\frac{1}{2}r\sim}\,\text{BesselI}\left(0, \frac{1}{2}r\sim\right)$$

$$\text{"MGF"}, \frac{\int_{e^{-1}}^{1} \frac{e^{t\,x}}{\sqrt{1+\ln(x)}\ \sqrt{-\ln(x)}\ x}\,dx}{\pi}$$

WARNING(PlotDist): Low value provided by user, 0
is less than minimum support value of random variable
e^{-1}
Resetting low to RV's minimum support value
WARNING(PlotDist): High value provided by user, 40
is greater than maximum support value of the random variable, 1
Resetting high to RV's maximum support value
WARNING(PlotDist): Low value provided by user, 0
is less than minimum support value of random variable
e^{-1}
Resetting low to RV's minimum support value
WARNING(PlotDist): High value provided by user, 40
is greater than maximum support value of the random variable, 1
Resetting high to RV's maximum support value

```
{\frac {1}{\pi\,\sqrt {-\ln  \left( x \right)  \left( 1+\ln
\left( x
 \right)  \right) }x}}
```

"i is", 8,
" ----------"

"l and u", 0, ∞

$$\text{"g(x)"}, -\ln(x), \text{"base"}, \frac{1}{\pi\sqrt{x\,(1-x)}}, \text{"ArcSinRV()"}$$

$$\text{"f(x)"}, \frac{e^{-\frac{1}{2}x}}{\sqrt{1-e^{-x}}\ \pi}$$

$$\text{"F(x)"}, \frac{2\arctan\left(\sqrt{e^{x}-1}\right)}{\pi}$$

$$\text{"IDF(x)"}, \left[\left[s \to \ln\left(\frac{1}{\cos\left(\frac{1}{2}\,s\,\pi\right)^{2}}\right)\right], [0, 1], [\text{"Continuous"}, \text{"IDF"}]\right]$$

$$\text{"S(x)"}, \frac{\pi - 2\arctan\left(\sqrt{e^{x}-1}\right)}{\pi}$$

$$\text{"h(x)"},\ \frac{e^{-\frac{1}{2}x}}{\sqrt{1-e^{-x}}\left(\pi-2\arctan\left(\sqrt{e^{x}-1}\right)\right)}$$

$$\text{"mean and variance"},\ 2\ln(2),\ \frac{1}{3}\pi^{2}$$

$$\text{"MF"},\ \int_{0}^{\infty}\frac{x^{r\sim}e^{-\frac{1}{2}x}}{\sqrt{1-e^{-x}}\,\pi}\,dx$$

$$\text{"MGF"},\ \int_{0}^{\infty}\frac{e^{\frac{1}{2}x(2t-1)}}{\sqrt{1-e^{-x}}\,\pi}\,dx$$

```
{\frac {{{\rm e}^{-x/2}}}{\sqrt {1-{{\rm e}^{-x}}}\pi}}
```

"i is", 9,

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

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

$$\text{"g(x)"},\ \ln(x+1),\ \text{"base"},\ \frac{1}{\pi\sqrt{x\,(1-x)}},\ \text{"ArcSinRV()"}$$

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

$$\text{"F(x)"},\ \frac{1}{2}\,\frac{\pi+2\arcsin\left(2\,e^{x}-3\right)}{\pi}$$

$$\text{"IDF(x)"},\ \left[\left[s\to-\ln(2)+\ln\left(-\cos(s\,\pi)+3\right)\right],\ [0,\ 1],\ [\text{"Continuous"},\ \text{"IDF"}]\right]$$

$$\text{"S(x)"},\ \frac{1}{2}\,\frac{\pi-2\arcsin\left(2\,e^{x}-3\right)}{\pi}$$

$$\text{"h(x)"},\ \frac{2\,e^{x}}{\sqrt{-\left(e^{x}-1\right)\left(-2+e^{x}\right)}\left(\pi-2\arcsin\left(2\,e^{x}-3\right)\right)}$$

$$\text{"mean and variance"},\ \frac{\displaystyle\int_{0}^{\ln(2)}\frac{x\,e^{x}}{\sqrt{e^{x}-1}\,\sqrt{2-e^{x}}}\,dx}{\pi},$$

$$\frac{\left(\displaystyle\int_{0}^{\ln(2)}\frac{x^{2}\,e^{x}}{\sqrt{e^{x}-1}\,\sqrt{2-e^{x}}}\,dx\right)\pi-\left(\displaystyle\int_{0}^{\ln(2)}\frac{x\,e^{x}}{\sqrt{e^{x}-1}\,\sqrt{2-e^{x}}}\,dx\right)^{2}}{\pi^{2}}$$

$$\text{"MF"}, \int_0^{\ln(2)} \frac{x^{r\sim}\, e^x}{\sqrt{-\left(e^x-1\right)\left(-2+e^x\right)}\,\pi}\, dx$$

$$\text{"MGF"}, \frac{\int_0^{\ln(2)} \frac{e^{x(t+1)}}{\sqrt{e^x-1}\,\sqrt{2-e^x}}\, dx}{\pi}$$

WARNING(PlotDist): High value provided by user, 40 *is greater than maximum support value of the random variable*, $\ln(2)$

Resetting high to RV's maximum support value

WARNING(PlotDist): High value provided by user, 40 *is greater than maximum support value of the random variable*, $\ln(2)$

Resetting high to RV's maximum support value

```
{\frac {{{\rm e}^{x}}}{\sqrt {- \left( {{\rm e}^{x}}-1 \right)
 \left( -2+{{\rm e}^{x}} \right) }\pi}}
```

"i is", 10,

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

"l and u", 0, ∞

$$\text{"g(x)"}, \frac{1}{\ln(x+2)}, \text{"base"}, \frac{1}{\pi\sqrt{x\,(1-x)}}, \text{"ArcSinRV()"}$$

$$\text{"f(x)"}, \frac{e^{\frac{1}{x}}}{\sqrt{-\left(e^{\frac{1}{x}}-2\right)\left(-3+e^{\frac{1}{x}}\right)}\,\pi x^2}$$

$$\text{"F(x)"}, \frac{1}{2}\,\frac{\pi-2\arcsin\left(2\,e^{\frac{1}{x}}-5\right)}{\pi}$$

$$\text{"IDF(x)"}, \left[\left[s\to \frac{1}{-\ln(2)+\ln\left(\cos(s\,\pi)+5\right)}\right], [0, 1], [\text{"Continuous"}, \text{"IDF"}]\right]$$

$$\text{"S(x)"}, \frac{1}{2}\,\frac{\pi+2\arcsin\left(2\,e^{\frac{1}{x}}-5\right)}{\pi}$$

$$\text{"h(x)"}, \frac{2\,e^{\frac{1}{x}}}{\sqrt{-\left(e^{\frac{1}{x}}-2\right)\left(-3+e^{\frac{1}{x}}\right)}\,x^2\left(\pi+2\arcsin\left(2\,e^{\frac{1}{x}}-5\right)\right)}$$

$$\text{"mean and variance"}, \frac{\int_{\frac{1}{\ln(3)}}^{\frac{1}{\ln(2)}} \frac{e^{\frac{1}{x}}}{x\sqrt{e^{\frac{1}{x}}-2}\sqrt{3-e^{\frac{1}{x}}}}\,dx}{\pi},$$

$$\frac{\left(\int_{\frac{1}{\ln(3)}}^{\frac{1}{\ln(2)}} \frac{e^{\frac{1}{x}}}{\sqrt{e^{\frac{1}{x}}-2}\sqrt{3-e^{\frac{1}{x}}}}\,dx\right)\pi - \left(\int_{\frac{1}{\ln(3)}}^{\frac{1}{\ln(2)}} \frac{e^{\frac{1}{x}}}{x\sqrt{e^{\frac{1}{x}}-2}\sqrt{3-e^{\frac{1}{x}}}}\,dx\right)^2}{\pi^2}$$

$$\text{"MF"}, \int_{\frac{1}{\ln(3)}}^{\frac{1}{\ln(2)}} \frac{x^{r\sim} e^{\frac{1}{x}}}{\sqrt{-\left(e^{\frac{1}{x}}-2\right)\left(-3+e^{\frac{1}{x}}\right)}\,\pi x^2}\,dx$$

$$\text{"MGF"}, \frac{\int_{\frac{1}{\ln(3)}}^{\frac{1}{\ln(2)}} \frac{e^{\frac{tx^2+1}{x}}}{\sqrt{e^{\frac{1}{x}}-2}\sqrt{3-e^{\frac{1}{x}}}\,x^2}\,dx}{\pi}$$

WARNING(PlotDist): Low value provided by user, 0 *is less than minimum support value of random variable* $\frac{1}{\ln(3)}$

Resetting low to RV's minimum support value

WARNING(PlotDist): High value provided by user, 40 *is greater than maximum support value of the random variable*, $\frac{1}{\ln(2)}$

Resetting high to RV's maximum support value

WARNING(PlotDist): Low value provided by user, 0 *is less than minimum support value of random variable*

$$\frac{1}{\ln(3)}$$

Resetting low to RV's minimum support value

WARNING(PlotDist): High value provided by user, 40 *is greater than maximum support value of the random variable,* $\frac{1}{\ln(2)}$

Resetting high to RV's maximum support value

```
{\frac {{{\rm e}^{{x}^{-1}}}}{\sqrt {- \left( {{\rm e}^{{x}^{-1}
}}-2
 \right)  \left( -3+{{\rm e}^{{x}^{-1}}} \right) }\pi\,{x}^{2}}}
```

"i is", 11,

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

"l and u", 0, ∞

"g(x)", $\tanh(x)$, "base", $\frac{1}{\pi\sqrt{x\,(1-x)}}$, "ArcSinRV()"

"f(x)", $-\frac{1}{\pi\sqrt{-\operatorname{arctanh}(x)\,(-1+\operatorname{arctanh}(x))}\,(x^2-1)}$

"F(x)", $-\frac{\int_0^x \frac{1}{\sqrt{-\operatorname{arctanh}(t)\,(-1+\operatorname{arctanh}(t))}\,(t^2-1)}\,dt}{\pi}$

"S(x)", $\frac{\pi+\int_0^x \frac{1}{\sqrt{-\operatorname{arctanh}(t)\,(-1+\operatorname{arctanh}(t))}\,(t^2-1)}\,dt}{\pi}$

"h(x)", $-1\Big/\left(\sqrt{-\operatorname{arctanh}(x)\,(-1+\operatorname{arctanh}(x))}\,(x^2-1)\left(\pi+\int_0^x \frac{1}{\sqrt{-\operatorname{arctanh}(t)\,(-1+\operatorname{arctanh}(t))}\,(t^2-1)}\,dt\right)\right)$

"mean and variance", $-\frac{\int_0^{\tanh(1)} \frac{x}{\sqrt{\operatorname{arctanh}(x)}\,\sqrt{1-\operatorname{arctanh}(x)}\,(x^2-1)}\,dx}{\pi}$,

$-\frac{1}{\pi^2}\left(\left(\int_0^{\tanh(1)} \frac{x}{\sqrt{\operatorname{arctanh}(x)}\,\sqrt{1-\operatorname{arctanh}(x)}\,(x^2-1)}\,dx\right)^2+\left(\right.\right.$

$$\int_0^{\tanh(1)} \frac{x^2}{\sqrt{\operatorname{arctanh}(x)}\ \sqrt{1-\operatorname{arctanh}(x)}\ (x^2-1)}\,dx\Bigg)\,\pi\Bigg)$$

$$\text{"MF"}, \int_0^{\tanh(1)} \left(-\frac{x^{r\sim}}{\pi\sqrt{-\operatorname{arctanh}(x)\ (-1+\operatorname{arctanh}(x))}\ (x^2-1)}\right) dx$$

$$\text{"MGF"}, -\frac{\int_0^{\tanh(1)} \frac{e^{t\,x}}{\sqrt{\operatorname{arctanh}(x)}\ \sqrt{1-\operatorname{arctanh}(x)}\ (x^2-1)}\,dx}{\pi}$$

WARNING(PlotDist): High value provided by user, 40
is greater than maximum support value of the random variable, tanh(1)
Resetting high to RV's maximum support value
WARNING(PlotDist): High value provided by user, 40
is greater than maximum support value of the random variable, tanh(1)
Resetting high to RV's maximum support value

```
-{\frac {1}{\pi\,\sqrt {-{\rm arctanh} \left(x\right) \left( -1+
{\rm arctanh} \left(x\right) \right) } \left( {x}^{2}-1 \right)
}}
```

"i is", 12,

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

"l and u", 0, ∞

$$\text{"g(x)"}, \sinh(x), \text{"base"}, \frac{1}{\pi\sqrt{x\ (1-x)}}, \text{"ArcSinRV()"}$$

$$\text{"f(x)"}, \frac{1}{\pi\sqrt{-\operatorname{arcsinh}(x)\ (-1+\operatorname{arcsinh}(x))}\ \sqrt{x^2+1}}$$

$$\text{"F(x)"}, \frac{1}{2}\ \frac{\pi-2\arcsin\left(1+2\ln\left(-x+\sqrt{x^2+1}\right)\right)}{\pi}$$

$$\text{"IDF(x)"}, \left[\left[s\to -\frac{1}{2}\ \left(e^{\cos(s\,\pi)}-1\right)\ e^{-\frac{1}{2}\cos(s\,\pi)+\frac{1}{2}}\right], [0,1], [\text{"Continuous"}, \text{"IDF"}]\right]$$

$$\text{"S(x)"}, \frac{1}{2}\ \frac{\pi+2\arcsin\left(1+2\ln\left(-x+\sqrt{x^2+1}\right)\right)}{\pi}$$

$$\text{"h(x)"}, \frac{2}{\sqrt{-\operatorname{arcsinh}(x)\ (-1+\operatorname{arcsinh}(x))}\ \sqrt{x^2+1}\ \left(\pi+2\arcsin\left(1+2\ln\left(-x+\sqrt{x^2+1}\right)\right)\right)}$$

"mean and variance", $\frac{\int_0^{\sinh(1)} \frac{x}{\sqrt{\operatorname{arcsinh}(x)}\ \sqrt{1-\operatorname{arcsinh}(x)}\ \sqrt{x^2+1}}\,dx}{\pi}$, $\frac{1}{\pi^2}\left(\left(\int_0^{\sinh(1)} \frac{x^2}{\sqrt{\operatorname{arcsinh}(x)}\ \sqrt{1-\operatorname{arcsinh}(x)}\ \sqrt{x^2+1}}\,dx\right)\pi - \left(\int_0^{\sinh(1)} \frac{x}{\sqrt{\operatorname{arcsinh}(x)}\ \sqrt{1-\operatorname{arcsinh}(x)}\ \sqrt{x^2+1}}\,dx\right)^2\right)$

"MF", $\int_0^{\sinh(1)} \frac{x^{r\sim}}{\pi\sqrt{-\operatorname{arcsinh}(x)\ (-1+\operatorname{arcsinh}(x))}\ \sqrt{x^2+1}}\,dx$

"MGF", $\frac{\int_0^{\sinh(1)} \frac{e^{t\,x}}{\sqrt{\operatorname{arcsinh}(x)}\ \sqrt{1-\operatorname{arcsinh}(x)}\ \sqrt{x^2+1}}\,dx}{\pi}$

WARNING(PlotDist): High value provided by user, 40 *is greater than maximum support value of the random variable*, sinh(1)

Resetting high to RV's maximum support value

WARNING(PlotDist): High value provided by user, 40 *is greater than maximum support value of the random variable*, sinh(1)

Resetting high to RV's maximum support value

```
{\frac {1}{\pi\,\sqrt {-{\rm arcsinh} \left(x\right) \left( -1+
{\rm arcsinh} \left(x\right) \right) }\sqrt {{x}^{2}+1}}}
```

"i is", 13,

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

"l and u", 0, ∞

"g(x)", $\operatorname{arcsinh}(x)$, "base", $\frac{1}{\pi\sqrt{x\ (1-x)}}$, "ArcSinRV()"

"f(x)", $\frac{\cosh(x)}{\sqrt{-\sinh(x)\ (-1+\sinh(x))}\ \pi}$

"F(x)", $\frac{1}{2}\ \frac{\pi + 2\arcsin\left(e^x - 1 - e^{-x}\right)}{\pi}$

"IDF(x)", $\left[\left[s \to -\ln(2) + \ln\left(-\cos(s\,\pi) + 1 + \sqrt{\cos(s\,\pi)^2 - 2\cos(s\,\pi) + 5}\right)\right], [0, 1],$

["Continuous", "IDF"]]

$$\text{"S(x)"},\ \frac{1}{2}\ \frac{\pi - 2\arcsin\left(e^{x} - 1 - e^{-x}\right)}{\pi}$$

$$\text{"h(x)"},\ \frac{2\cosh(x)}{\sqrt{-\sinh(x)\ (-1+\sinh(x))}\ \left(\pi - 2\arcsin\left(e^{x} - 1 - e^{-x}\right)\right)}$$

$$\text{"mean and variance"},\ \frac{\int_{0}^{-\ln\left(\sqrt{2}-1\right)} \frac{x\cosh(x)}{\sqrt{\sinh(x)}\ \sqrt{1-\sinh(x)}}\,dx}{\pi},\ \frac{1}{\pi^{2}}\left(\left(\int_{0}^{-\ln\left(\sqrt{2}-1\right)} \frac{x^{2}\cosh(x)}{\sqrt{\sinh(x)}\ \sqrt{1-\sinh(x)}}\,dx\right)\pi - \left(\int_{0}^{-\ln\left(\sqrt{2}-1\right)} \frac{x\cosh(x)}{\sqrt{\sinh(x)}\ \sqrt{1-\sinh(x)}}\,dx\right)^{2}\right)$$

$$\text{"MF"},\ \int_{0}^{-\ln\left(\sqrt{2}-1\right)} \frac{x^{r\sim}\cosh(x)}{\sqrt{-\sinh(x)\ (-1+\sinh(x))}\ \pi}\,dx$$

$$\text{"MGF"},\ \frac{\int_{0}^{-\ln\left(\sqrt{2}-1\right)} \frac{e^{t\,x}\cosh(x)}{\sqrt{\sinh(x)}\ \sqrt{1-\sinh(x)}}\,dx}{\pi}$$

WARNING(PlotDist): High value provided by user, 40 *is greater than maximum support value of the random variable*, $-\ln\left(\sqrt{2}-1\right)$

Resetting high to RV's maximum support value

WARNING(PlotDist): High value provided by user, 40 *is greater than maximum support value of the random variable*, $-\ln\left(\sqrt{2}-1\right)$

Resetting high to RV's maximum support value

```
{\frac {\cosh \left( x \right) }{\sqrt {-\sinh \left( x \right)
 \left( -1+\sinh \left( x \right)  \right) }\pi }}
```

"i is", 14,

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

"l and u", 0, ∞

$$\text{"g(x)"},\ \operatorname{csch}(x+1),\ \text{"base"},\ \frac{1}{\pi\sqrt{x\ (1-x)}},\ \text{"ArcSinRV()"}$$

$$\text{"f(x)"}, \frac{1}{\sqrt{-(-1+\operatorname{arccsch}(x))\,(-2+\operatorname{arccsch}(x))}\,\sqrt{x^2+1}\,\pi\,|x|}$$

"i is", 15,
" ----------"

"i is", 16,
" ----------"

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

$$\text{"g(x)"}, \frac{1}{\tanh(x+1)}, \text{"base"}, \frac{1}{\pi\sqrt{x\,(1-x)}}, \text{"ArcSinRV()"}$$

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

$$\text{"F(x)"}, \frac{\arcsin\left(-3+2\operatorname{arctanh}\left(\frac{e^4-1}{e^4+1}\right)\right)-\arcsin\left(-3+2\operatorname{arctanh}\left(\frac{1}{x}\right)\right)}{\pi}$$

$$\text{"IDF(x)"}, \left[\left[s\to -\frac{1}{\tanh\left(-\frac{3}{2}+\frac{1}{2}\sin\left(s\,\pi-\arcsin\left(-3+2\operatorname{arctanh}\left(\frac{e^4-1}{e^4+1}\right)\right)\right)\right)}\right], [0,1],$$
$$[\text{"Continuous"}, \text{"IDF"}]\Bigg]$$

$$\text{"S(x)"}, \frac{\pi-\arcsin\left(-3+2\operatorname{arctanh}\left(\frac{e^4-1}{e^4+1}\right)\right)+\arcsin\left(-3+2\operatorname{arctanh}\left(\frac{1}{x}\right)\right)}{\pi}$$

$$\text{"h(x)"}, 1\Bigg/\left(\sqrt{-\left(-1+\operatorname{arctanh}\left(\frac{1}{x}\right)\right)\left(-2+\operatorname{arctanh}\left(\frac{1}{x}\right)\right)}\,(x^2-1)\left(\pi-\arcsin\left(-3\right.\right.\right.$$
$$\left.\left.\left.+2\operatorname{arctanh}\left(\frac{e^4-1}{e^4+1}\right)\right)+\arcsin\left(-3+2\operatorname{arctanh}\left(\frac{1}{x}\right)\right)\right)\right)$$

"mean and variance",

$$\frac{\int_{\frac{e^4+1}{e^4-1}}^{\frac{e^2+1}{e^2-1}} \frac{x}{\sqrt{-\left(-1+\operatorname{arctanh}\left(\frac{1}{x}\right)\right)\left(-2+\operatorname{arctanh}\left(\frac{1}{x}\right)\right)\left(x^2-1\right)}}\,dx}{\pi}, \frac{1}{\pi^2}\left(\left(\int_{\frac{e^4+1}{e^4-1}}^{\frac{e^2+1}{e^2-1}} \frac{x^2}{\sqrt{-\left(-1+\operatorname{arctanh}\left(\frac{1}{x}\right)\right)\left(-2+\operatorname{arctanh}\left(\frac{1}{x}\right)\right)\left(x^2-1\right)}}\,dx\right)\pi - \left(\int_{\frac{e^4+1}{e^4-1}}^{\frac{e^2+1}{e^2-1}} \frac{x}{\sqrt{-\left(-1+\operatorname{arctanh}\left(\frac{1}{x}\right)\right)\left(-2+\operatorname{arctanh}\left(\frac{1}{x}\right)\right)\left(x^2-1\right)}}\,dx\right)^2\right)$$

$$\text{"MF"}, \int_{\frac{e^{-2}+e^2}{-e^{-2}+e^2}}^{\frac{e+e^{-1}}{e-e^{-1}}} \frac{x^{r\sim}}{\sqrt{-\left(-1+\operatorname{arctanh}\left(\frac{1}{x}\right)\right)\left(-2+\operatorname{arctanh}\left(\frac{1}{x}\right)\right)}\,\pi\left(x^2-1\right)}\,dx$$

$$\text{"MGF"}, \frac{\int_{\frac{e^4+1}{e^4-1}}^{\frac{e^2+1}{e^2-1}} \frac{e^{t\,x}}{\sqrt{-\left(-1+\operatorname{arctanh}\left(\frac{1}{x}\right)\right)\left(-2+\operatorname{arctanh}\left(\frac{1}{x}\right)\right)\left(x^2-1\right)}}\,dx}{\pi}$$

WARNING(PlotDist): Low value provided by user, 0
is less than minimum support value of random variable

$$\frac{e^{-2}+e^2}{-e^{-2}+e^2}$$

Resetting low to RV's minimum support value
WARNING(PlotDist): High value provided by user, 40

is greater than maximum support value of the random

variable, $\frac{e+e^{-1}}{e-e^{-1}}$

Resetting high to RV's maximum support value

WARNING(PlotDist): Low value provided by user, 0

is less than minimum support value of random variable

$$\frac{e^{-2}+e^{2}}{-e^{-2}+e^{2}}$$

Resetting low to RV's minimum support value

WARNING(PlotDist): High value provided by user, 40

is greater than maximum support value of the random

variable, $\frac{e+e^{-1}}{e-e^{-1}}$

Resetting high to RV's maximum support value

```
{\frac {1}{\sqrt {- \left( -1+{\rm arctanh} \left({x}^{-1}
\right)
 \right)  \left( -2+{\rm arctanh} \left({x}^{-1}\right) \right)
}\pi\,
 \left( {x}^{2}-1 \right) }}
```

"i is", 17,

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

"l and u", 0, ∞

"g(x)", $\frac{1}{\sinh(x+1)}$, "base", $\frac{1}{\pi\sqrt{x\,(1-x)}}$, "ArcSinRV()"

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

"F(x)", $\frac{\int_{\frac{2e^2}{e^4-1}}^{x}\frac{1}{\sqrt{-\left(-1+\operatorname{arcsinh}\left(\frac{1}{t}\right)\right)\left(-2+\operatorname{arcsinh}\left(\frac{1}{t}\right)\right)}\,\sqrt{t^2+1}\,|t|}\,dt}{\pi}$

"S(x)", $\frac{\pi-\left(\int_{\frac{2e^2}{e^4-1}}^{x}\frac{1}{\sqrt{-\left(-1+\operatorname{arcsinh}\left(\frac{1}{t}\right)\right)\left(-2+\operatorname{arcsinh}\left(\frac{1}{t}\right)\right)}\,\sqrt{t^2+1}\,|t|}\,dt\right)}{\pi}$

$$\text{"h(x)"},\ 1 \Big/ \left(\sqrt{-\left(-1+\operatorname{arcsinh}\left(\frac{1}{x}\right)\right)\left(-2+\operatorname{arcsinh}\left(\frac{1}{x}\right)\right)}\ \sqrt{x^2+1}\ |x| \left(\pi - \left(\int_{\frac{2e^2}{e^4-1}}^{x} \frac{1}{\sqrt{-\left(-1+\operatorname{arcsinh}\left(\frac{1}{t}\right)\right)\left(-2+\operatorname{arcsinh}\left(\frac{1}{t}\right)\right)}\ \sqrt{t^2+1}\ |t|}\, dt \right) \right) \right)$$

$$\text{"mean and variance"},\ \frac{\int_{\frac{2e^2}{e^4-1}}^{\frac{2e}{e^2-1}} \frac{1}{\sqrt{-1+\operatorname{arcsinh}\left(\frac{1}{x}\right)}\ \sqrt{2-\operatorname{arcsinh}\left(\frac{1}{x}\right)}\ \sqrt{x^2+1}}\, dx}{\pi},$$

$$\frac{1}{\pi^2}\left(\left(\int_{\frac{2e^2}{e^4-1}}^{\frac{2e}{e^2-1}} \frac{x}{\sqrt{-1+\operatorname{arcsinh}\left(\frac{1}{x}\right)}\ \sqrt{2-\operatorname{arcsinh}\left(\frac{1}{x}\right)}\ \sqrt{x^2+1}}\, dx \right) \pi - \left(\int_{\frac{2e^2}{e^4-1}}^{\frac{2e}{e^2-1}} \frac{1}{\sqrt{-1+\operatorname{arcsinh}\left(\frac{1}{x}\right)}\ \sqrt{2-\operatorname{arcsinh}\left(\frac{1}{x}\right)}\ \sqrt{x^2+1}}\, dx \right)^2 \right)$$

$$\text{"MF"},\ \int_{\frac{2}{-e^{-2}+e^2}}^{-\frac{2}{e^{-1}-e}} \frac{x^{r\sim}}{\sqrt{-\left(-1+\operatorname{arcsinh}\left(\frac{1}{x}\right)\right)\left(-2+\operatorname{arcsinh}\left(\frac{1}{x}\right)\right)}\ \sqrt{x^2+1}\ \pi\ |x|}\, dx$$

$$\text{"MGF"}, \frac{\int_{\frac{2e^2}{e^4-1}}^{\frac{2e}{e^2-1}} \frac{e^{tx}}{\sqrt{-1+\operatorname{arcsinh}\left(\frac{1}{x}\right)}\sqrt{2-\operatorname{arcsinh}\left(\frac{1}{x}\right)}\sqrt{x^2+1}\,x}\,dx}{\pi}$$

```
{\frac {1}{\sqrt {- \left( -1+{\rm arcsinh} \left({x}^{-1}
\right)
 \right)  \left( -2+{\rm arcsinh} \left({x}^{-1}\right) \right)
}
\sqrt {{x}^{2}+1}\pi\, \left| x \right| }}
```

"i is", 18,

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

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

$$\text{"g(x)"}, \frac{1}{\operatorname{arcsinh}(x+1)}, \text{"base"}, \frac{1}{\pi\sqrt{x\,(1-x)}}, \text{"ArcSinRV()"}$$

$$\text{"f(x)"}, \frac{\cosh\left(\frac{1}{x}\right)}{\sqrt{-\cosh\left(\frac{1}{x}\right)^2+3\sinh\left(\frac{1}{x}\right)-1}\,\pi x^2}$$

$$\text{"F(x)"}, \frac{1}{2}\,\frac{\pi-2\arcsin\left(e^{\frac{1}{x}}-3-e^{-\frac{1}{x}}\right)}{\pi}$$

$$\text{"IDF(x)"}, \left[\left[s\to-\frac{1}{\ln(2)-\ln\left(\cos(s\pi)+3+\sqrt{\cos(s\pi)^2+6\cos(s\pi)+13}\right)}\right], [0,1], \text{["Continuous", "IDF"]}\right]$$

$$\text{"S(x)"}, \frac{1}{2}\,\frac{\pi+2\arcsin\left(e^{\frac{1}{x}}-3-e^{-\frac{1}{x}}\right)}{\pi}$$

$$\text{"h(x)"}, \frac{2\cosh\left(\frac{1}{x}\right)}{\sqrt{-\cosh\left(\frac{1}{x}\right)^2+3\sinh\left(\frac{1}{x}\right)-1}\,x^2\left(\pi+2\arcsin\left(e^{\frac{1}{x}}-3-e^{-\frac{1}{x}}\right)\right)}$$

$$\text{"mean and variance"}, \frac{\int_{-\frac{1}{\ln(-2+\sqrt{5})}}^{\frac{1}{\ln(1+\sqrt{2})}} \frac{\cosh\left(\frac{1}{x}\right)}{x\sqrt{-\cosh\left(\frac{1}{x}\right)^2+3\sinh\left(\frac{1}{x}\right)-1}}\,dx}{\pi}, \frac{1}{\pi^2}\left(\left(\int_{-\frac{1}{\ln(-2+\sqrt{5})}}^{\frac{1}{\ln(1+\sqrt{2})}} \frac{\cosh\left(\frac{1}{x}\right)}{\sqrt{-\cosh\left(\frac{1}{x}\right)^2+3\sinh\left(\frac{1}{x}\right)-1}}\,dx\right)\pi - \left(\int_{-\frac{1}{\ln(-2+\sqrt{5})}}^{\frac{1}{\ln(1+\sqrt{2})}} \frac{\cosh\left(\frac{1}{x}\right)}{x\sqrt{-\cosh\left(\frac{1}{x}\right)^2+3\sinh\left(\frac{1}{x}\right)-1}}\,dx\right)^2\right)$$

$$\text{"MF"}, \int_{-\frac{1}{\ln(-2+\sqrt{5})}}^{\frac{1}{\ln(1+\sqrt{2})}} \frac{x^{r\sim}\cosh\left(\frac{1}{x}\right)}{\sqrt{-\cosh\left(\frac{1}{x}\right)^2+3\sinh\left(\frac{1}{x}\right)-1}\;\pi x^2}\,dx$$

$$\text{"MGF"}, \frac{\int_{-\frac{1}{\ln(-2+\sqrt{5})}}^{\frac{1}{\ln(1+\sqrt{2})}} \frac{e^{t\,x}\cosh\left(\frac{1}{x}\right)}{\sqrt{-\cosh\left(\frac{1}{x}\right)^2+3\sinh\left(\frac{1}{x}\right)-1}\;x^2}\,dx}{\pi}$$

WARNING(PlotDist): Low value provided by user, 0
is less than minimum support value of random variable

$$-\frac{1}{\ln\left(-2+\sqrt{5}\right)}$$

Resetting low to RV's minimum support value

WARNING(PlotDist): High value provided by user, 40 *is greater than maximum support value of the random variable*, $\frac{1}{\ln\left(1+\sqrt{2}\right)}$

Resetting high to RV's maximum support value

WARNING(PlotDist): Low value provided by user, 0 *is less than minimum support value of random variable*

$$-\frac{1}{\ln\left(-2+\sqrt{5}\right)}$$

Resetting low to RV's minimum support value

WARNING(PlotDist): High value provided by user, 40 *is greater than maximum support value of the random variable*, $\frac{1}{\ln\left(1+\sqrt{2}\right)}$

Resetting high to RV's maximum support value

```
{\frac {\cosh \left( {x}^{-1} \right) }{\sqrt {- \left( \cosh \left( {
x}^{-1} \right)  \right) ^{2}+3\,\sinh \left( {x}^{-1} \right) -1}\pi
\,{x}^{2}}}
```

"i is", 19,

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

"l and u", 0, ∞

"g(x)", $\frac{1}{\operatorname{csch}(x)}+1$, "base", $\frac{1}{\pi\sqrt{x\,(1-x)}}$, "ArcSinRV()"

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

"F(x)", $\frac{\int_1^x \frac{1}{\sqrt{-\operatorname{arccsch}\left(\frac{1}{t-1}\right)\left(-1+\operatorname{arccsch}\left(\frac{1}{t-1}\right)\right)}\sqrt{t^2-2t+2}}\,dt}{\pi}$

"S(x)", $\frac{\pi-\left(\int_1^x \frac{1}{\sqrt{-\operatorname{arccsch}\left(\frac{1}{t-1}\right)\left(-1+\operatorname{arccsch}\left(\frac{1}{t-1}\right)\right)}\sqrt{t^2-2t+2}}\,dt\right)}{\pi}$

"h(x)", $1 \Big/ \left(\sqrt{-\operatorname{arccsch}\left(\frac{1}{x-1}\right)\left(-1+\operatorname{arccsch}\left(\frac{1}{x-1}\right)\right)}\ \sqrt{x^2-2x+2}\left(\pi-\left(\int_1^x \frac{1}{\sqrt{-\operatorname{arccsch}\left(\frac{1}{t-1}\right)\left(-1+\operatorname{arccsch}\left(\frac{1}{t-1}\right)\right)}\ \sqrt{t^2-2t+2}}\,dt\right)\right)\right)$

"mean and variance",

$$\frac{\int_1^{-\frac{1}{2}e^{-1}+\frac{1}{2}e+1} \frac{x}{\sqrt{\operatorname{arccsch}\left(\frac{1}{x-1}\right)}\ \sqrt{1-\operatorname{arccsch}\left(\frac{1}{x-1}\right)}\ \sqrt{x^2-2x+2}}\,dx}{\pi},$$

$$\frac{1}{\pi^2}\left(\left(\left(\int_1^{-\frac{1}{2}e^{-1}+\frac{1}{2}e+1} \frac{x^2}{\sqrt{\operatorname{arccsch}\left(\frac{1}{x-1}\right)}\ \sqrt{1-\operatorname{arccsch}\left(\frac{1}{x-1}\right)}\ \sqrt{x^2-2x+2}}\right)dx\right)\pi-\left(\int_1^{-\frac{1}{2}e^{-1}+\frac{1}{2}e+1} \frac{x}{\sqrt{\operatorname{arccsch}\left(\frac{1}{x-1}\right)}\ \sqrt{1-\operatorname{arccsch}\left(\frac{1}{x-1}\right)}\ \sqrt{x^2-2x+2}}\,dx\right)^2\right)$$

"MF", $\int_1^{-\frac{1}{2}e^{-1}+\frac{1}{2}e+1} \frac{x^{t\sim}}{\sqrt{-\operatorname{arccsch}\left(\frac{1}{x-1}\right)\left(-1+\operatorname{arccsch}\left(\frac{1}{x-1}\right)\right)}\ \sqrt{x^2-2x+2}\ \pi}\,dx$

"MGF", $\frac{\int_1^{-\frac{1}{2}e^{-1}+\frac{1}{2}e+1} \frac{e^{tx}}{\sqrt{\operatorname{arccsch}\left(\frac{1}{x-1}\right)}\ \sqrt{1-\operatorname{arccsch}\left(\frac{1}{x-1}\right)}\ \sqrt{x^2-2x+2}}\,dx}{\pi}$

WARNING(PlotDist): Low value provided by user, 0

is less than minimum support value of random variable

1

Resetting low to RV's minimum support value

WARNING(PlotDist): High value provided by user, 40

is greater than maximum support value of the random

variable, $-\frac{1}{2}\,e^{-1}+\frac{1}{2}\,e+1$

Resetting high to RV's maximum support value

WARNING(PlotDist): Low value provided by user, 0

is less than minimum support value of random variable

1

Resetting low to RV's minimum support value

WARNING(PlotDist): High value provided by user, 40

is greater than maximum support value of the random

variable, $-\frac{1}{2}\,e^{-1}+\frac{1}{2}\,e+1$

Resetting high to RV's maximum support value

```
{\frac {1}{\sqrt {-{\rm arccsch} \left( \left( x-1 \right) ^{-1}
\right) \left( -1+{\rm arccsch} \left( \left( x-1 \right) ^{-1}
\right)
 \right) }\sqrt {{x}^{2}-2\,x+2}\pi}}
```

"i is", 20,

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

"l and u", 0, ∞

"g(x)", $\tanh\left(\frac{1}{x}\right)$, "base", $\frac{1}{\pi\sqrt{x\,(1-x)}}$, "ArcSinRV()"

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

"F(x)", $\frac{2\sqrt{\frac{-1+\operatorname{arctanh}(x)}{\operatorname{arctanh}(x)^2}}\,\operatorname{arctanh}(x)\arctan\left(\sqrt{-1+\operatorname{arctanh}(x)}\right)}{\sqrt{-1+\operatorname{arctanh}(x)}\,\pi}$

"IDF(x)", $\left[\left[s\to\tanh\left(\frac{1}{\cos\left(\frac{1}{2}\,s\,\pi\right)^2}\right)\right],\,[0,\,1],\,[\text{"Continuous"},\,\text{"IDF"}]\right]$

"S(x)",

$$\frac{-2\sqrt{\frac{-1+\operatorname{arctanh}(x)}{\operatorname{arctanh}(x)^2}}\,\operatorname{arctanh}(x)\arctan\left(\sqrt{-1+\operatorname{arctanh}(x)}\right)+\sqrt{-1+\operatorname{arctanh}(x)}\,\pi}{\sqrt{-1+\operatorname{arctanh}(x)}\,\pi}$$

$$\text{"h(x)"},\ -\sqrt{-1+\operatorname{arctanh}(x)}\ \Bigg/\left(\sqrt{\frac{-1+\operatorname{arctanh}(x)}{\operatorname{arctanh}(x)^2}}\ \operatorname{arctanh}(x)^2\left(x^2-1\right)\left(-2\sqrt{\frac{-1+\operatorname{arctanh}(x)}{\operatorname{arctanh}(x)^2}}\ \operatorname{arctanh}(x)\ \arctan\left(\sqrt{-1+\operatorname{arctanh}(x)}\right)+\sqrt{-1+\operatorname{arctanh}(x)}\ \pi\right)\right)$$

$$\text{"mean and variance"},\ -\frac{\displaystyle\int_{\frac{e^2-1}{e^2+1}}^{1}\frac{x}{\operatorname{arctanh}(x)\sqrt{-1+\operatorname{arctanh}(x)}\ \left(x^2-1\right)}\,dx}{\pi},\ -\frac{1}{\pi^2}\left(\left(\int_{\frac{e^2-1}{e^2+1}}^{1}\frac{x^2}{\operatorname{arctanh}(x)\sqrt{-1+\operatorname{arctanh}(x)}\ \left(x^2-1\right)}\,dx\right)\pi+\left(\int_{\frac{e^2-1}{e^2+1}}^{1}\frac{x}{\operatorname{arctanh}(x)\sqrt{-1+\operatorname{arctanh}(x)}\ \left(x^2-1\right)}\,dx\right)^2\right)$$

$$\text{"MF"},\ \int_{\frac{e-e^{-1}}{e+e^{-1}}}^{1}\left(-\frac{x^{r\sim}}{\sqrt{\frac{-1+\operatorname{arctanh}(x)}{\operatorname{arctanh}(x)^2}}\ \pi\operatorname{arctanh}(x)^2\left(x^2-1\right)}\right)dx$$

$$\text{"MGF"},\ -\frac{\displaystyle\int_{\frac{e^2-1}{e^2+1}}^{1}\frac{e^{tx}}{\operatorname{arctanh}(x)\sqrt{-1+\operatorname{arctanh}(x)}\ \left(x^2-1\right)}\,dx}{\pi}$$

WARNING(PlotDist): Low value provided by user, 0
is less than minimum support value of random variable
$\frac{e-e^{-1}}{e+e^{-1}}$
Resetting low to RV's minimum support value
WARNING(PlotDist): High value provided by user, 40
is greater than maximum support value of the random variable, 1

Resetting high to RV's maximum support value

WARNING(PlotDist): Low value provided by user, 0
is less than minimum support value of random variable

$$\frac{e-e^{-1}}{e+e^{-1}}$$

Resetting low to RV's minimum support value

WARNING(PlotDist): High value provided by user, 40
is greater than maximum support value of the random variable, 1

Resetting high to RV's maximum support value

```
-{\frac {1}{\pi\, \left( {\rm arctanh} \left(x\right) \right) ^
{2}
 \left( {x}^{2}-1 \right) }{\frac {1}{\sqrt {{\frac {-1+{\rm
arctanh}
\left(x\right)}{ \left( {\rm arctanh} \left(x\right) \right) ^
{2}}}}}}
}
```

"i is", 21,

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

"l and u", 0, ∞

"g(x)", $\operatorname{csch}\left(\frac{1}{x}\right)$, "base", $\frac{1}{\pi\sqrt{x\,(1-x)}}$, "ArcSinRV()"

"f(x)", $\frac{1}{\sqrt{\frac{\operatorname{arccsch}(x)-1}{\operatorname{arccsch}(x)^2}}\,\sqrt{x^2+1}\,\pi\operatorname{arccsch}(x)^2\,|x|}$

"i is", 22,

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

"l and u", 0, ∞

"g(x)", $\operatorname{arccsch}\left(\frac{1}{x}\right)$, "base", $\frac{1}{\pi\sqrt{x\,(1-x)}}$, "ArcSinRV()"

"f(x)", $\frac{\cosh(x)}{\pi\sqrt{-\sinh(x)\,(-1+\sinh(x))}}$

"F(x)", $\frac{1}{2}\,\frac{\pi+2\arcsin\left(e^x-1-e^{-x}\right)}{\pi}$

"IDF(x)", $\left[\left[s\to -\ln(2)+\ln\left(-\cos(s\,\pi)+1+\sqrt{\cos(s\,\pi)^2-2\cos(s\,\pi)+5}\right)\right],\,[0,\,1],\,[\text{"Continuous"},\,\text{"IDF"}]\right]$

"S(x)", $\frac{1}{2}\,\frac{\pi-2\arcsin\left(e^x-1-e^{-x}\right)}{\pi}$

$$\text{"h(x)"},\ \frac{2\cosh(x)}{\sqrt{-\sinh(x)\ (-1+\sinh(x))}\ \left(\pi-2\arcsin\left(e^{x}-1-e^{-x}\right)\right)}$$

$$\text{"mean and variance"},\ \frac{\int_{0}^{\ln\left(1+\sqrt{2}\right)}\frac{x\cosh(x)}{\sqrt{\sinh(x)}\ \sqrt{1-\sinh(x)}}\,dx}{\pi},$$

$$\frac{1}{\pi^{2}}\left(\left(\int_{0}^{\ln\left(1+\sqrt{2}\right)}\frac{x^{2}\cosh(x)}{\sqrt{\sinh(x)}\ \sqrt{1-\sinh(x)}}\,dx\right)\pi-\left(\int_{0}^{\ln\left(1+\sqrt{2}\right)}\frac{x\cosh(x)}{\sqrt{\sinh(x)}\ \sqrt{1-\sinh(x)}}\,dx\right)^{2}\right)$$

$$\text{"MF"},\ \int_{0}^{\ln\left(1+\sqrt{2}\right)}\frac{x^{r\sim}\cosh(x)}{\pi\sqrt{-\sinh(x)\ (-1+\sinh(x))}}\,dx$$

$$\text{"MGF"},\ \frac{\int_{0}^{\ln\left(1+\sqrt{2}\right)}\frac{e^{t\,x}\cosh(x)}{\sqrt{\sinh(x)}\ \sqrt{1-\sinh(x)}}\,dx}{\pi}$$

WARNING(PlotDist): High value provided by user, 40 *is greater than maximum support value of the random variable*, $\ln\left(1+\sqrt{2}\right)$

Resetting high to RV's maximum support value

WARNING(PlotDist): High value provided by user, 40 *is greater than maximum support value of the random variable*, $\ln\left(1+\sqrt{2}\right)$

Resetting high to RV's maximum support value

```
{\frac {\cosh \left( x \right) }{\pi\,\sqrt {-\sinh \left( x \right)
 \left( -1+\sinh \left( x \right)  \right) }}}
```