```
> 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(1);
  bfname := "MuthRV(1)";
```

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

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

```
> #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);
```

$$-\ln(y) \quad \textbf{(2)}$$

```
> # 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.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));
  print("F(x)", CDF(Temp, x));
  if i=11 then print("IDF did not work") elif i=12 then print
("IDF did not work") elif i=14 then print("IDF did not work")
elif i=19 then print("IDF did not work") elif i=21 then print
("IDF did not work") else print("IDF(x)", IDF(Temp)) end if;
  print("S(x)", SF(Temp, x));
  print("h(x)", HF(Temp, x));
  if i=18 then print("Mean and Variance did not work") else print
("mean and variance", Mean(Temp), Variance(Temp)) end if;
  assume(r > 0); mf := int(x^r*PDF(Temp, x), x = Temp[2][1] ..
Temp[2][2]):
  print("MF", mf);
  if i=18 then print("MGF didn't work") else print("MGF", MGF
(Temp)) end if;
  #PlotDist(PDF(Temp), 0, 40);
  #PlotDist(HF(Temp), 0, 40);
  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 if i=18 then= ", PDF(Temp,x));


  #latex output
  appendto(filename);
  printf("--------------------------------------------------------------
------------------------------------  \\\\");
  printf("$$");
  latex(glist[i]);
  printf("$$");
  printf("Probability Distribution Function \n$$  f(x)=");
  latex(PDF(Temp,x));
  printf("$$");
  printf("Cumulative Distribution Function  \n $$F(x)=");
  latex(CDF(Temp,x));
  printf("$$");
```

```
    printf(" Inverse Cumulative Distribution Function \n ");
    printf(" $$F^{-1} = ");
    if i=11 then print("Unable to find IDF") elif i=12 then print
   ("Unable to find IDF") elif i=14 then print("Unable to find IDF")
   elif i=19 then print("Unable to find IDF") elif i=21 then print
   ("Unable to find IDF") else latex(IDF(Temp)[1]) end if;
    printf("$$");
    printf("Survivor Function \n $$ S(x)=");
    latex(SF(Temp, x));
    printf("$$ Hazard Function \n $$ h(x)=");
    latex(HF(Temp,x));
    printf("$$");
    printf("Mean \n $$ \mu=");
    if i=18 then print("Unable to find Mean") else latex(Mean(Temp)
   ) end if;
    printf("$$ Variance \n $$ \sigma^2 = ");
    if i=18 then print("Unable to find Variance") else latex
   (Variance(Temp)) end if;
    printf("$$");
    printf("Moment Function \n $$ m(x) = ");
    latex(mf);
    printf("$$ Moment Generating Function \n $$");
    if i=18 then print("unable to calculate MGF") else latex(MGF
   (Temp)[1]) end if;
    printf("$$");
    #latex(MGF(Temp)[1]);

    writeto(terminal);


  od;

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

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

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

"i is", 1,
" --
----------"

$$g := t \rightarrow t^{2}$$

$$l := 0$$

$$u := \infty$$

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

"l and u", 0, ∞

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

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

$$\text{"F(x)"}, -e^{-e^{\sqrt{x}}+\sqrt{x}+1}+1$$

$$\text{"IDF(x)"}, \left[\left[s \rightarrow \left(\mathrm{LambertW}\left((s-1)\, e^{-1}\right)+1-\ln(1-s)\right)^2\right], [0, 1], [\text{"Continuous"}, \text{"IDF"}]\right]$$

$$\text{"S(x)"}, e^{-e^{\sqrt{x}}+\sqrt{x}+1}$$

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

$$\text{"mean and variance"}, \int_0^{\infty} \frac{1}{2} \sqrt{x} \left(e^{\sqrt{x}}-1\right) e^{-e^{\sqrt{x}}+\sqrt{x}+1}\, dx, \int_0^{\infty} \frac{1}{2}\, x^{3/2} \left(e^{\sqrt{x}}-1\right) e^{-e^{\sqrt{x}}+\sqrt{x}+1}\, dx - \left(\int_0^{\infty} \frac{1}{2} \sqrt{x} \left(e^{\sqrt{x}}-1\right) e^{-e^{\sqrt{x}}+\sqrt{x}+1}\, dx\right)^2$$

$$mf := \int_0^{\infty} \frac{1}{2}\, \frac{x^{r\sim} \left(e^{\sqrt{x}}-1\right) e^{-e^{\sqrt{x}}+\sqrt{x}+1}}{\sqrt{x}}\, dx$$

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

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

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

"i is", 2,

" ---"

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

$$l := 0$$

$$u := \infty$$

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

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

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

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

$$\text{"F(x)"}, -e^{-e^{x^2}+x^2+1}+1$$

ERROR(IDF): Could not find the appropriate inverse

ERROR(IDF): Could not find the appropriate inverse

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

$$\text{"S(x)"}, \mathrm{e}^{-\mathrm{e}^{x^2}+x^2+1}$$

$$\text{"h(x)"}, 2\left(\mathrm{e}^{x^2}-1\right)x$$

$$\text{"mean and variance"}, \int_0^\infty 2x^2\left(\mathrm{e}^{x^2}-1\right)\mathrm{e}^{-\mathrm{e}^{x^2}+x^2+1}\,dx, 1-\left(\int_0^\infty 2x^2\left(\mathrm{e}^{x^2}-1\right)\mathrm{e}^{-\mathrm{e}^{x^2}+x^2+1}\,dx\right)^2$$

$$mf := \int_0^\infty 2x^{r\sim}\left(\mathrm{e}^{x^2}-1\right)\mathrm{e}^{-\mathrm{e}^{x^2}+x^2+1}x\,dx$$

$$\text{"MF"}, \int_0^\infty 2x^{r\sim}\left(\mathrm{e}^{x^2}-1\right)\mathrm{e}^{-\mathrm{e}^{x^2}+x^2+1}x\,dx$$

$$\text{"MGF"}, \int_0^\infty 2\left(\mathrm{e}^{x^2}-1\right)x\,\mathrm{e}^{tx-\mathrm{e}^{x^2}+x^2+1}\,dx$$

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

"i is", 3,

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

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

$$l := 0$$

$$u := \infty$$

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

"l and u", 0, ∞

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

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

$$\text{"F(x)"}, \mathrm{e}^{-\frac{\mathrm{e}^{\frac{1}{x}}x-x-1}{x}}$$

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

$$\text{"S(x)"}, 1-\mathrm{e}^{-\frac{\mathrm{e}^{\frac{1}{x}}x-x-1}{x}}$$

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

$$\text{"mean and variance"},\ \int_0^\infty \frac{\left(e^{\frac{1}{x}}-1\right)e^{-\frac{e^{\frac{1}{x}}x-x-1}{x}}}{x}\,dx,\ \infty-\left(\int_0^\infty \frac{\left(e^{\frac{1}{x}}-1\right)e^{-\frac{e^{\frac{1}{x}}x-x-1}{x}}}{x}\,dx\right)^2$$

$$mf := \int_0^\infty \frac{x^{r\sim}\left(e^{\frac{1}{x}}-1\right)e^{-\frac{e^{\frac{1}{x}}x-x-1}{x}}}{x^2}\,dx$$

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

$$\text{"MGF"},\ \int_0^\infty \frac{\left(e^{\frac{1}{x}}-1\right)e^{-\frac{-t x^2+e^{\frac{1}{x}}x-x-1}{x}}}{x^2}\,dx$$

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

"i is", 4,

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

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

$$l := 0$$

$$u := \infty$$

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

"PDF"]]

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

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

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

$$\text{"F(x)"}, -e^{-e^{\tan(x)}+\tan(x)+1}+1$$

"IDF(x)", $[[s \rightarrow \arctan\left(-1+\ln(1-s)-\mathrm{LambertW}\left((s-1)\,e^{-1}\right)\right)], [0, 1], [\text{"Continuous"}, \text{"IDF"}]]$

$$\text{"S(x)"}, e^{-e^{\tan(x)}+\tan(x)+1}$$

$$\text{"h(x)"}, \left(e^{\tan(x)}-1\right)\left(1+\tan(x)^2\right)$$

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

$$-\left(\int_0^{\frac{1}{2}\pi} \frac{x\left(e^{-\frac{e^{\frac{\sin(x)}{\cos(x)}}\cos(x)-2\sin(x)-\cos(x)}{\cos(x)}}-e^{-\frac{e^{\frac{\sin(x)}{\cos(x)}}\cos(x)-\sin(x)-\cos(x)}{\cos(x)}}\right)}{\cos(x)^2}\, dx\right)^2$$

$$mf := \int_0^{\frac{1}{2}\pi} x^{r\sim}\left(e^{\tan(x)}-1\right) e^{-e^{\tan(x)}+\tan(x)+1}\left(1+\tan(x)^2\right) dx$$

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

$$\text{"MGF"}, \int_0^{\frac{1}{2}\pi} \left(\tan(x)^2 e^{tx-e^{\tan(x)}+2\tan(x)+1} - e^{tx-e^{\tan(x)}+\tan(x)+1}\tan(x)^2 + e^{tx-e^{\tan(x)}+2\tan(x)+1} - e^{tx-e^{\tan(x)}+\tan(x)+1}\right) dx$$

```
 \left( {{\rm e}^{\tan \left( x \right) }}-1 \right) {{\rm e}^{-
{
{\rm e}^{\tan \left( x \right) }}+\tan \left( x \right) +1}}
```

```
\left( 1+
 \left( \tan \left( x \right)  \right) ^{2} \right)
```
"i is", 5,

" --

----------"

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

$$l := 0$$

$$u := \infty$$

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

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

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

$$\text{"f(x)"}, (x - 1)\, e^{1 - x}$$

$$\text{"F(x)"}, 1 - x\, e^{1 - x}$$

$$\text{"IDF(x)"}, [[s \to -\mathrm{LambertW}\left((s - 1)\, e^{-1}\right)], [0, 1], [\text{"Continuous"}, \text{"IDF"}]]$$

$$\text{"S(x)"}, x\, e^{1 - x}$$

$$\text{"h(x)"}, \frac{x - 1}{x}$$

$$\text{"mean and variance"}, 3, 2$$

$$mf := e \left(\frac{\pi \csc(\pi r{\sim})}{\Gamma(-r{\sim} - 1)} - e^{-\frac{1}{2}} \mathrm{WhittakerM}\left(\frac{1}{2} r{\sim}, \frac{1}{2} r{\sim} + \frac{1}{2}, 1\right) - \frac{(-2 - r{\sim})\, e^{-\frac{1}{2}} \mathrm{WhittakerM}\left(\frac{1}{2} r{\sim} + 1, \frac{1}{2} r{\sim} + \frac{1}{2}, 1\right)}{r{\sim} + 2} \right) - e \left(-\frac{\pi \csc(\pi r{\sim})}{\Gamma(-r{\sim})} - \frac{e^{-\frac{1}{2}} \mathrm{WhittakerM}\left(\frac{1}{2} r{\sim}, \frac{1}{2} r{\sim} + \frac{1}{2}, 1\right)}{r{\sim} + 1} \right)$$

$$\text{"MF"}, e \left(\frac{\pi \csc(\pi r{\sim})}{\Gamma(-r{\sim} - 1)} - e^{-\frac{1}{2}} \mathrm{WhittakerM}\left(\frac{1}{2} r{\sim}, \frac{1}{2} r{\sim} + \frac{1}{2}, 1\right) - \frac{(-2 - r{\sim})\, e^{-\frac{1}{2}} \mathrm{WhittakerM}\left(\frac{1}{2} r{\sim} + 1, \frac{1}{2} r{\sim} + \frac{1}{2}, 1\right)}{r{\sim} + 2} \right) - e \left(-\frac{\pi \csc(\pi r{\sim})}{\Gamma(-r{\sim})} - \frac{e^{-\frac{1}{2}} \mathrm{WhittakerM}\left(\frac{1}{2} r{\sim}, \frac{1}{2} r{\sim} + \frac{1}{2}, 1\right)}{r{\sim} + 1} \right)$$

$$\text{"MGF"}, \lim_{x \to \infty} \frac{e^{t x - x + 1}\, t x - t\, e^{t x - x + 1} - e^{t x - x + 1}\, x + e^{t}}{t^{2} - 2 t + 1}$$

\left(x-1 \right) {{\rm e}^{1-x}}

"i is", 6,

" --"

$$g := t \to \ln(t)$$
$$l := 0$$
$$u := \infty$$
$$Temp := \left[\left[y\sim \to \left(\mathrm{e}^{\mathrm{e}^{y\sim}} - 1\right) \mathrm{e}^{-\mathrm{e}^{\mathrm{e}^{y\sim}} + \mathrm{e}^{y\sim} + 1 + y\sim}\right], [-\infty, \infty], [\text{"Continuous"}, \text{"PDF"}]\right]$$

"l and u", 0, ∞

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

"f(x)", $\left(\mathrm{e}^{\mathrm{e}^{x}} - 1\right) \mathrm{e}^{-\mathrm{e}^{\mathrm{e}^{x}} + \mathrm{e}^{x} + 1 + x}$

"F(x)", $-\mathrm{e}^{1 + \mathrm{e}^{x} - \mathrm{e}^{\mathrm{e}^{x}}} + 1$

"IDF(x)", $\left[\left[s \to \ln\left(-1 + \ln(1 - s) - \mathrm{LambertW}\left((s - 1)\, \mathrm{e}^{-1}\right)\right)\right], [0, 1], [\text{"Continuous"}, \text{"IDF"}]\right]$

"S(x)", $\mathrm{e}^{1 + \mathrm{e}^{x} - \mathrm{e}^{\mathrm{e}^{x}}}$

"h(x)", $\left(\mathrm{e}^{\mathrm{e}^{x}} - 1\right) \mathrm{e}^{x}$

"mean and variance", $\int_{-\infty}^{\infty} x \left(\mathrm{e}^{\mathrm{e}^{x}} - 1\right) \mathrm{e}^{-\mathrm{e}^{\mathrm{e}^{x}} + \mathrm{e}^{x} + 1 + x} \, dx$, $\int_{-\infty}^{\infty} x^2 \left(\mathrm{e}^{\mathrm{e}^{x}} - 1\right) \mathrm{e}^{-\mathrm{e}^{\mathrm{e}^{x}} + \mathrm{e}^{x} + 1 + x} \, dx - \left(\int_{-\infty}^{\infty} x \left(\mathrm{e}^{\mathrm{e}^{x}} - 1\right) \mathrm{e}^{-\mathrm{e}^{\mathrm{e}^{x}} + \mathrm{e}^{x} + 1 + x} \, dx\right)^2$

$$mf := \int_{-\infty}^{\infty} x^{r\sim} \left(\mathrm{e}^{\mathrm{e}^{x}} - 1\right) \mathrm{e}^{-\mathrm{e}^{\mathrm{e}^{x}} + \mathrm{e}^{x} + 1 + x} \, dx$$

"MF", $\int_{-\infty}^{\infty} x^{r\sim} \left(\mathrm{e}^{\mathrm{e}^{x}} - 1\right) \mathrm{e}^{-\mathrm{e}^{\mathrm{e}^{x}} + \mathrm{e}^{x} + 1 + x} \, dx$

"MGF", $\int_{-\infty}^{\infty} \left(\mathrm{e}^{\mathrm{e}^{x}} - 1\right) \mathrm{e}^{t x - \mathrm{e}^{\mathrm{e}^{x}} + \mathrm{e}^{x} + 1 + x} \, dx$

\left({{\rm e}^{{{\rm e}^{x}}}}-1 \right) {{\rm e}^{-{{\rm e}^
{{
{\rm e}^{x}}}}+{{\rm e}^{x}}+1+x}}

"i is", 7,

" --"

$$g := t \to \mathrm{e}^{-t}$$
$$l := 0$$
$$u := \infty$$
$$Temp := \left[\left[y\sim \to -\frac{(y\sim - 1)\, \mathrm{e}^{\frac{y\sim - 1}{y\sim}}}{y\sim^3}\right], [0, 1], [\text{"Continuous"}, \text{"PDF"}]\right]$$

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

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

$$\text{"f(x)"},\ -\frac{(x-1)\,\mathrm{e}^{\frac{x-1}{x}}}{x^{3}}$$

$$\text{"F(x)"},\ \frac{\mathrm{e}^{\frac{x-1}{x}}}{x}$$

$$\text{"IDF(x)"},\ \left[\left[s\rightarrow-\frac{1}{\mathrm{LambertW}\left(-s\,\mathrm{e}^{-1}\right)}\right],\ [0,1],\ [\text{"Continuous"},\ \text{"IDF"}]\right]$$

$$\text{"S(x)"},\ -\frac{-x+\mathrm{e}^{\frac{x-1}{x}}}{x}$$

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

$$\text{"mean and variance"},\ -\mathrm{e}\,\mathrm{Ei}(1,1)+1,\ -\mathrm{e}^{2}\,\mathrm{Ei}(1,1)^{2}+4\,\mathrm{e}\,\mathrm{Ei}(1,1)-2$$

$$mf := -\mathrm{e}\left(\frac{\pi\csc(\pi\,r\sim)}{\Gamma(r\sim)}+\frac{\mathrm{e}^{-\frac{1}{2}}\,\mathrm{WhittakerM}\left(-\frac{1}{2}\,r\sim,\ -\frac{1}{2}\,r\sim+\frac{1}{2},\ 1\right)}{r\sim-1}\right)+\mathrm{e}\left(-\frac{\pi\csc(\pi\,r\sim)}{\Gamma(r\sim-1)}+\frac{(2-r\sim)\,\mathrm{e}^{-\frac{1}{2}}\,\mathrm{WhittakerM}\left(-\frac{1}{2}\,r\sim,\ -\frac{1}{2}\,r\sim+\frac{1}{2},\ 1\right)}{r\sim-2}+\mathrm{e}^{-\frac{1}{2}}\,\mathrm{WhittakerM}\left(-\frac{1}{2}\,r\sim+1,\ -\frac{1}{2}\,r\sim+\frac{1}{2},\ 1\right)\right)$$

$$\text{"MF"},\ -\mathrm{e}\left(\frac{\pi\csc(\pi\,r\sim)}{\Gamma(r\sim)}+\frac{\mathrm{e}^{-\frac{1}{2}}\,\mathrm{WhittakerM}\left(-\frac{1}{2}\,r\sim,\ -\frac{1}{2}\,r\sim+\frac{1}{2},\ 1\right)}{r\sim-1}\right)+\mathrm{e}\left(-\frac{\pi\csc(\pi\,r\sim)}{\Gamma(r\sim-1)}+\frac{(2-r\sim)\,\mathrm{e}^{-\frac{1}{2}}\,\mathrm{WhittakerM}\left(-\frac{1}{2}\,r\sim,\ -\frac{1}{2}\,r\sim+\frac{1}{2},\ 1\right)}{r\sim-2}+\mathrm{e}^{-\frac{1}{2}}\,\mathrm{WhittakerM}\left(-\frac{1}{2}\,r\sim+1,\ -\frac{1}{2}\,r\sim+\frac{1}{2},\ 1\right)\right)$$

$$"MGF", -\left(\int_0^1 \frac{(x-1)\,\mathrm{e}^{\frac{t x^2+x-1}{x}}}{x^3}\,dx\right)$$

```
-{\frac {x-1}{{x}^{3}}{{\rm e}^{{\frac {x-1}{x}}}}}
```

"i is", 8,

" --
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$$g := t \rightarrow -\ln(t)$$

$$l := 0$$

$$u := \infty$$

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

$$"l and u", 0, \infty$$

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

$$"f(x)", \left(\mathrm{e}^{\mathrm{e}^{-x}}-1\right)\mathrm{e}^{-\mathrm{e}^{\mathrm{e}^{-x}}+\mathrm{e}^{-x}+1-x}$$

$$"F(x)", \mathrm{e}^{-\mathrm{e}^{\mathrm{e}^{-x}}+1+\mathrm{e}^{-x}}$$

$$"IDF(x)", \left[\left[s \rightarrow -\ln\left(-\mathrm{LambertW}\left(-s\,\mathrm{e}^{-1}\right)-1+\ln(s)\right)\right], [0, 1], ["Continuous", "IDF"]\right]$$

$$"S(x)", 1-\mathrm{e}^{-\mathrm{e}^{\mathrm{e}^{-x}}+1+\mathrm{e}^{-x}}$$

$$"h(x)", -\frac{\left(\mathrm{e}^{\mathrm{e}^{-x}}-1\right)\mathrm{e}^{-\mathrm{e}^{\mathrm{e}^{-x}}+\mathrm{e}^{-x}+1-x}}{-1+\mathrm{e}^{-\mathrm{e}^{\mathrm{e}^{-x}}+1+\mathrm{e}^{-x}}}$$

$$"mean and variance", \int_{-\infty}^{\infty} x\left(\mathrm{e}^{\mathrm{e}^{-x}}-1\right)\mathrm{e}^{-\mathrm{e}^{\mathrm{e}^{-x}}+\mathrm{e}^{-x}+1-x}\,dx, \int_{-\infty}^{\infty} x^2\left(\mathrm{e}^{\mathrm{e}^{-x}}-1\right)\mathrm{e}^{-\mathrm{e}^{\mathrm{e}^{-x}}+\mathrm{e}^{-x}+1-x}\,dx-\left(\int_{-\infty}^{\infty} x\left(\mathrm{e}^{\mathrm{e}^{-x}}-1\right)\mathrm{e}^{-\mathrm{e}^{\mathrm{e}^{-x}}+\mathrm{e}^{-x}+1-x}\,dx\right)^2$$

$$mf := \int_{-\infty}^{\infty} x^{r\sim}\left(\mathrm{e}^{\mathrm{e}^{-x}}-1\right)\mathrm{e}^{-\mathrm{e}^{\mathrm{e}^{-x}}+\mathrm{e}^{-x}+1-x}\,dx$$

$$"MF", \int_{-\infty}^{\infty} x^{r\sim}\left(\mathrm{e}^{\mathrm{e}^{-x}}-1\right)\mathrm{e}^{-\mathrm{e}^{\mathrm{e}^{-x}}+\mathrm{e}^{-x}+1-x}\,dx$$

$$"MGF", \int_{-\infty}^{\infty}\left(\mathrm{e}^{\mathrm{e}^{-x}}-1\right)\mathrm{e}^{t x-\mathrm{e}^{\mathrm{e}^{-x}}+\mathrm{e}^{-x}+1-x}\,dx$$

```
 \left( {{\rm e}^{{{\rm e}^{-x}}}}-1 \right) {{\rm e}^{-{{\rm e}
^{{
{\rm e}^{-x}}}}+{{\rm e}^{-x}}+1-x}}
```

"i is", 9,

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

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

$$l := 0$$

$$u := \infty$$

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

"l and u", 0, ∞

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

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

"F(x)", $1-e^{e^{x}-e^{e^{x}-1}}$

"IDF(x)", $[[s \rightarrow \ln(-\mathrm{LambertW}((s-1)\, e^{-1})+\ln(1-s))], [0, 1], [\text{"Continuous"}, \text{"IDF"}]]$

"S(x)", $e^{e^{x}-e^{e^{x}-1}}$

"h(x)", $\left(e^{e^{x}-1}-1\right) e^{x}$

"mean and variance", $\int_0^{\infty} x \left(e^{e^{x}-1}-1\right) e^{-e^{e^{x}-1}+e^{x}+x} \mathrm{d}x$, $\int_0^{\infty} x^2 \left(e^{e^{x}-1}-1\right) e^{-e^{e^{x}-1}+e^{x}+x} \mathrm{d}x$

$$-\left(\int_0^{\infty} x \left(e^{e^{x}-1}-1\right) e^{-e^{e^{x}-1}+e^{x}+x} \mathrm{d}x\right)^2$$

$$mf := \int_0^{\infty} x^{r\sim} \left(e^{e^{x}-1}-1\right) e^{-e^{e^{x}-1}+e^{x}+x} \mathrm{d}x$$

"MF", $\int_0^{\infty} x^{r\sim} \left(e^{e^{x}-1}-1\right) e^{-e^{e^{x}-1}+e^{x}+x} \mathrm{d}x$

"MGF", $\int_0^{\infty} \left(e^{e^{x}-1}-1\right) e^{t x-e^{e^{x}-1}+e^{x}+x} \mathrm{d}x$

```
 \left( {{\rm e}^{{{\rm e}^{x}}-1}}-1 \right) {{\rm e}^{-{{\rm
e}^{{
{\rm e}^{x}}-1}}+{{\rm e}^{x}}+x}}
```

"i is", 10,

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

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

$$l := 0$$

$$u := \infty$$

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

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

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

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

$$\text{"F(x)"},\ e^{-1-e^{e^{\frac{1}{x}}-2}+e^{\frac{1}{x}}}$$

$$\text{"IDF(x)"},\ \left[\left[s\rightarrow\frac{1}{\ln\left(1-\text{LambertW}\left(-e^{-1}s\right)+\ln(s)\right)}\right],[0,1],[\text{"Continuous"},\text{"IDF"}]\right]$$

$$\text{"S(x)"},\ 1-e^{-1-e^{e^{\frac{1}{x}}-2}+e^{\frac{1}{x}}}$$

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

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

$$mf := \int_{0}^{\frac{1}{\ln(2)}}\frac{x^{r\sim}\left(e^{e^{\frac{1}{x}}-2}-1\right)e^{-\frac{e^{e^{\frac{1}{x}}-2}x-e^{\frac{1}{x}}x+x-1}{x}}}{x^{2}}\,dx$$

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

$$\text{"MGF"}, \int_0^{\frac{1}{\ln(2)}} \frac{\left({\rm e}^{{\rm e}^{\frac{1}{x}}-2}-1\right) {\rm e}^{\frac{t x^2+{\rm e}^{\frac{1}{x}} x-{\rm e}^{{\rm e}^{\frac{1}{x}}-2} x-x+1}{x}}}{x^2} \, {\rm d}x$$

```
{\frac {{{\rm e}^{{{\rm e}^{{x}^{-1}}}-2}}-1}{{x}^{2}}{{\rm e}^
{-{
\frac {{{\rm e}^{{{\rm e}^{{x}^{-1}}}-2}}x-{{\rm e}^{{x}^{-1}}}
x+x-1}{
x}}}}}
```

"i is", 11,

" --"

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

$$l := 0$$

$$u := \infty$$

$$Temp := \left[\left[y\sim \to -\frac{\left(-y\sim-1+\sqrt{-y\sim^2+1}\right) {\rm e}^{\frac{\operatorname{arctanh}(y\sim)\sqrt{-y\sim^2+1}+\sqrt{-y\sim^2+1}-y\sim-1}{\sqrt{-y\sim^2+1}}}}{\left(-y\sim^2+1\right)^{3/2}}\right], [0, 1], [\text{"Continuous"}, \text{"PDF"}]\right]$$

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

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

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

$$\text{"F(x)"}, \int_0^x \left(-\frac{\left(-t-1+\sqrt{-t^2+1}\right) {\rm e}^{\frac{\operatorname{arctanh}(t)\sqrt{-t^2+1}+\sqrt{-t^2+1}-t-1}{\sqrt{-t^2+1}}}}{\left(-t^2+1\right)^{3/2}}\right) {\rm d}t$$

$$\text{"IDF did not work"}$$

$$\text{"S(x)"}, 1-\left(\int_0^x \left(-\frac{\left(-t-1+\sqrt{-t^2+1}\right) {\rm e}^{\frac{\operatorname{arctanh}(t)\sqrt{-t^2+1}+\sqrt{-t^2+1}-t-1}{\sqrt{-t^2+1}}}}{\left(-t^2+1\right)^{3/2}}\right) {\rm d}t\right)$$

"h(x)",

$$\left(\left(-x-1+\sqrt{-x^2+1}\right)\mathrm{e}^{\frac{\operatorname{arctanh}(x)\sqrt{-x^2+1}+\sqrt{-x^2+1}-x-1}{\sqrt{-x^2+1}}}\right)\Bigg/\left(\left(-x^2+1\right)^{3/2}\left(-1+\int_0^x\left(-\frac{\left(-t-1+\sqrt{-t^2+1}\right)\mathrm{e}^{\frac{\operatorname{arctanh}(t)\sqrt{-t^2+1}+\sqrt{-t^2+1}-t-1}{\sqrt{-t^2+1}}}}{\left(-t^2+1\right)^{3/2}}\right)\mathrm{d}t\right)\right)$$

$$\text{"mean and variance"},\int_0^1\left(-\frac{x\left(-x-1+\sqrt{-x^2+1}\right)\mathrm{e}^{\frac{\operatorname{arctanh}(x)\sqrt{-x^2+1}+\sqrt{-x^2+1}-x-1}{\sqrt{-x^2+1}}}}{\left(-x^2+1\right)^{3/2}}\right)\mathrm{d}x,\int_0^1\left(-\frac{x^2\left(-x-1+\sqrt{-x^2+1}\right)\mathrm{e}^{\frac{\operatorname{arctanh}(x)\sqrt{-x^2+1}+\sqrt{-x^2+1}-x-1}{\sqrt{-x^2+1}}}}{\left(-x^2+1\right)^{3/2}}\right)\mathrm{d}x-\left(\int_0^1\left(-\frac{x\left(-x-1+\sqrt{-x^2+1}\right)\mathrm{e}^{\frac{\operatorname{arctanh}(x)\sqrt{-x^2+1}+\sqrt{-x^2+1}-x-1}{\sqrt{-x^2+1}}}}{\left(-x^2+1\right)^{3/2}}\right)\mathrm{d}x\right)^2$$

$$mf:=\int_0^1\left(-\frac{x^{r\sim}\left(-x-1+\sqrt{-x^2+1}\right)\mathrm{e}^{\frac{\operatorname{arctanh}(x)\sqrt{-x^2+1}+\sqrt{-x^2+1}-x-1}{\sqrt{-x^2+1}}}}{\left(-x^2+1\right)^{3/2}}\right)\mathrm{d}x$$

$$\text{"MF"},\int_0^1\left(-\frac{x^{r\sim}\left(-x-1+\sqrt{-x^2+1}\right)\mathrm{e}^{\frac{\operatorname{arctanh}(x)\sqrt{-x^2+1}+\sqrt{-x^2+1}-x-1}{\sqrt{-x^2+1}}}}{\left(-x^2+1\right)^{3/2}}\right)\mathrm{d}x$$

$$\text{"MGF"},\int_0^1\left(-\frac{\left(-x-1+\sqrt{-x^2+1}\right)\mathrm{e}^{\frac{t\,x\sqrt{-x^2+1}+\operatorname{arctanh}(x)\sqrt{-x^2+1}+\sqrt{-x^2+1}-x-1}{\sqrt{-x^2+1}}}}{\left(-x^2+1\right)^{3/2}}\right)\mathrm{d}x$$

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

"i is", 12,

" --"

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

$$l := 0$$

$$u := \infty$$

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

$$"l and u", 0, \infty$$

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

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

$$"F(x)", \int_0^x \frac{\left(t + \sqrt{t^2+1} - 1\right) e^{-t - \sqrt{t^2+1} + \operatorname{arcsinh}(t) + 1}}{\sqrt{t^2+1}} \, dt$$

"IDF did not work"

$$"S(x)", 1 - \left(\int_0^x \frac{\left(t + \sqrt{t^2+1} - 1\right) e^{-t - \sqrt{t^2+1} + \operatorname{arcsinh}(t) + 1}}{\sqrt{t^2+1}} \, dt\right)$$

$$"h(x)", -\frac{\left(x + \sqrt{x^2+1} - 1\right) e^{-x - \sqrt{x^2+1} + \operatorname{arcsinh}(x) + 1}}{\sqrt{x^2+1}\left(-1 + \int_0^x \frac{\left(t + \sqrt{t^2+1} - 1\right) e^{-t - \sqrt{t^2+1} + \operatorname{arcsinh}(t) + 1}}{\sqrt{t^2+1}} \, dt\right)}$$

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

$$-\left(\int_0^{\infty} \frac{x\left(x+\sqrt{x^2+1}-1\right) \mathrm{e}^{-x-\sqrt{x^2+1}+\operatorname{arcsinh}(x)+1}}{\sqrt{x^2+1}} \, \mathrm{d}x\right)^2$$

$$mf := \int_0^{\infty} \frac{x^{r\sim}\left(x+\sqrt{x^2+1}-1\right) \mathrm{e}^{-x-\sqrt{x^2+1}+\operatorname{arcsinh}(x)+1}}{\sqrt{x^2+1}} \, \mathrm{d}x$$

$$\text{"MF"}, \int_0^{\infty} \frac{x^{r\sim}\left(x+\sqrt{x^2+1}-1\right) \mathrm{e}^{-x-\sqrt{x^2+1}+\operatorname{arcsinh}(x)+1}}{\sqrt{x^2+1}} \, \mathrm{d}x$$

$$\text{"MGF"}, \int_0^{\infty} \frac{\left(x+\sqrt{x^2+1}-1\right) \mathrm{e}^{t x-x-\sqrt{x^2+1}+\operatorname{arcsinh}(x)+1}}{\sqrt{x^2+1}} \, \mathrm{d}x$$

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

"i is", 13,

" --
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$$g := t \rightarrow \operatorname{arcsinh}(t)$$

$$l := 0$$

$$u := \infty$$

$$Temp := \left[\left[y\sim \rightarrow \left(\mathrm{e}^{\sinh(y\sim)}-1\right) \mathrm{e}^{-\mathrm{e}^{\sinh(y\sim)}+\sinh(y\sim)+1} \cosh(y\sim)\right], [0, \infty], [\text{"Continuous"}, \text{"PDF"}]\right]$$

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

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

$$\text{"f(x)"}, \left(\mathrm{e}^{\sinh(x)}-1\right) \mathrm{e}^{-\mathrm{e}^{\sinh(x)}+\sinh(x)+1} \cosh(x)$$

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

$$\text{"IDF(x)"}, \left[\left[s \rightarrow RootOf\left(-2\,\mathrm{e}^{\_Z}\ln\left(-2\,\mathrm{e}^{\_Z}\ln(1-s)+\mathrm{e}^{2\_Z}+2\,\mathrm{e}^{\_Z}-1\right)+2\,\mathrm{e}^{\_Z}\ln(2)+\mathrm{e}^{2\_Z}+2\,\_Z\,\mathrm{e}^{\_Z}-1\right)\right], [0, 1], [\text{"Continuous"}, \text{"IDF"}]\right]$$

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

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

$$\text{"mean and variance"}, \int_0^{\infty} x\left(\mathrm{e}^{\sinh(x)}-1\right)\mathrm{e}^{-\mathrm{e}^{\sinh(x)}+\sinh(x)+1}\cosh(x)\,\mathrm{d}x,$$

$$\int_0^\infty \cosh(x)\, x^2 \left(\mathrm{e}^{-\mathrm{e}^{\sinh(x)} + 2\sinh(x) + 1} - \mathrm{e}^{-\mathrm{e}^{\sinh(x)} + \sinh(x) + 1}\right) \mathrm{d}x - \left(\int_0^\infty x \left(\mathrm{e}^{\sinh(x)} - 1\right) \mathrm{e}^{-\mathrm{e}^{\sinh(x)} + \sinh(x) + 1} \cosh(x)\, \mathrm{d}x\right)^2$$

$$mf := \int_0^\infty x^{r\sim} \left(\mathrm{e}^{\sinh(x)} - 1\right) \mathrm{e}^{-\mathrm{e}^{\sinh(x)} + \sinh(x) + 1} \cosh(x)\, \mathrm{d}x$$

$$\text{"MF"}, \int_0^\infty x^{r\sim} \left(\mathrm{e}^{\sinh(x)} - 1\right) \mathrm{e}^{-\mathrm{e}^{\sinh(x)} + \sinh(x) + 1} \cosh(x)\, \mathrm{d}x$$

$$\text{"MGF"}, \int_0^\infty \left(\mathrm{e}^{\sinh(x)} - 1\right) \cosh(x)\, \mathrm{e}^{t x - \mathrm{e}^{\sinh(x)} + \sinh(x) + 1}\, \mathrm{d}x$$

```
 \left( {{\rm e}^{\sinh \left( x \right) }}-1 \right) {{\rm e}^
{-{
{\rm e}^{\sinh \left( x \right) }}+\sinh \left( x \right) +1}}
\cosh
 \left( x \right)
```

"i is", 14,

" --"

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

$$l := 0$$

$$u := \infty$$

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

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

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

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

$$\text{"F(x)"}, \int_0^x \frac{\left(\mathrm{e}^{-1 + \operatorname{arccsch}(t)} - 1\right) \mathrm{e}^{-\mathrm{e}^{-1 + \operatorname{arccsch}(t)} + \operatorname{arccsch}(t)}}{\sqrt{t^2 + 1}\, |t|}\, \mathrm{d}t$$

$$\text{"IDF did not work"}$$

$$\text{"S(x)"}, 1 - \left(\int_0^x \frac{\left(\mathrm{e}^{-1 + \operatorname{arccsch}(t)} - 1\right) \mathrm{e}^{-\mathrm{e}^{-1 + \operatorname{arccsch}(t)} + \operatorname{arccsch}(t)}}{\sqrt{t^2 + 1}\, |t|}\, \mathrm{d}t\right)$$

$$"h(x)", -\frac{\left(e^{-1+\operatorname{arccsch}(x)}-1\right) e^{-e^{-1+\operatorname{arccsch}(x)}+\operatorname{arccsch}(x)}}{\sqrt{x^2+1}\,|x|\left(-1+\int_0^x \frac{\left(e^{-1+\operatorname{arccsch}(t)}-1\right) e^{-e^{-1+\operatorname{arccsch}(t)}+\operatorname{arccsch}(t)}}{\sqrt{t^2+1}\,|t|}\,dt\right)}$$

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

$$\int_0^{\frac{2e}{e^2-1}} \frac{x\left(e^{-1+\operatorname{arccsch}(x)}-1\right) e^{-e^{-1+\operatorname{arccsch}(x)}+\operatorname{arccsch}(x)}}{\sqrt{x^2+1}}\,dx$$

$$-\left(\int_0^{\frac{2e}{e^2-1}} \frac{\left(e^{-1+\operatorname{arccsch}(x)}-1\right) e^{-e^{-1+\operatorname{arccsch}(x)}+\operatorname{arccsch}(x)}}{\sqrt{x^2+1}}\,dx\right)^2$$

$$mf := \int_0^{\frac{2}{e-e^{-1}}} \frac{x^{r\sim}\left(e^{-1+\operatorname{arccsch}(x)}-1\right) e^{-e^{-1+\operatorname{arccsch}(x)}+\operatorname{arccsch}(x)}}{\sqrt{x^2+1}\,|x|}\,dx$$

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

$$"MGF", \int_0^{\frac{2e}{e^2-1}} \frac{\left(e^{-1+\operatorname{arccsch}(x)}-1\right) e^{tx-e^{-1+\operatorname{arccsch}(x)}+\operatorname{arccsch}(x)}}{\sqrt{x^2+1}\,x}\,dx$$

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

"i is", 15,

" --"

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

$$l := 0$$

$$u := \infty$$

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

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

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

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

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

$$\text{"IDF(x)"}, \left[\left[s \rightarrow RootOf\left(-\mathrm{e}^{-\frac{\left(\mathrm{e}^{\frac{2\mathrm{e}^{2\_Z}\_Z+2\mathrm{e}^{\_Z}+1}{\mathrm{e}^{2\_Z}-1}}-\mathrm{e}^{\frac{2\mathrm{e}^{\_Z}+2\_Z+1}{\mathrm{e}^{2\_Z}-1}}-2\,\mathrm{e}^{\frac{\mathrm{e}^{2\_Z}\_Z+\mathrm{e}^{2\_Z}+\_Z}{\mathrm{e}^{2\_Z}-1}}\right)\mathrm{e}^{-\frac{\mathrm{e}^{2\_Z}+2\_Z}{\mathrm{e}^{2\_Z}-1}}}{\mathrm{e}^{2\_Z}-1}}+s\right)\right], [0, 1], \left[\text{"Continuous"}, \text{"IDF"}\right]\right]$$

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

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

"mean and variance",

$$\int_0^{\ln(1+\sqrt{2})} \frac{x\cosh(x)\left(e^{-\frac{e^{-\frac{\sinh(x)-1}{\sinh(x)}}\sinh(x)+\sinh(x)-2}{\sinh(x)}} - e^{-\frac{e^{-\frac{\sinh(x)-1}{\sinh(x)}}\sinh(x)-1}{\sinh(x)}}\right)}{\sinh(x)^2}\,dx,$$

$$\int_0^{\ln(1+\sqrt{2})} \frac{x^2\cosh(x)\left(e^{-\frac{e^{-\frac{\sinh(x)-1}{\sinh(x)}}\sinh(x)+\sinh(x)-2}{\sinh(x)}} - e^{-\frac{e^{-\frac{\sinh(x)-1}{\sinh(x)}}\sinh(x)-1}{\sinh(x)}}\right)}{\sinh(x)^2}\,dx$$

$$-\left(\int_0^{\ln(1+\sqrt{2})} \frac{x\cosh(x)\left(e^{-\frac{e^{-\frac{\sinh(x)-1}{\sinh(x)}}\sinh(x)+\sinh(x)-2}{\sinh(x)}} - e^{-\frac{e^{-\frac{\sinh(x)-1}{\sinh(x)}}\sinh(x)-1}{\sinh(x)}}\right)}{\sinh(x)^2}\,dx\right)^2$$

$$mf := \int_0^{\ln(1+\sqrt{2})} \frac{x^{r\sim}\left(e^{-\frac{\sinh(x)-1}{\sinh(x)}}-1\right)e^{-\frac{e^{-\frac{\sinh(x)-1}{\sinh(x)}}\sinh(x)-1}{\sinh(x)}}\cosh(x)}{\sinh(x)^2}\,dx$$

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

"MGF",

$$\int_0^{\ln(1+\sqrt{2})}$$

$$\frac{1}{\sinh(x)^2}\left(\cosh(x)\left(e^{-\frac{-t\,x\sinh(x)+e^{-\frac{\sinh(x)-1}{\sinh(x)}}\sinh(x)+\sinh(x)-2}{\sinh(x)}}\right.\right.$$

$$-\mathrm{e}^{-\frac{-t x \sinh(x)+\mathrm{e}^{-\frac{\sinh(x)-1}{\sinh(x)}}\,\sinh(x)-1}{\sinh(x)}}\Bigg)\Bigg)\,dx$$

```
{\frac {\cosh \left( x \right) }{ \left( \sinh \left( x \right)
 \right) ^{2}} \left( {{\rm e}^{-{\frac {\sinh \left( x \right)
-1}{
\sinh \left( x \right) }}}}-1 \right) {{\rm e}^{-{\frac {1}
{\sinh
 \left( x \right) } \left( {{\rm e}^{-{\frac {\sinh \left( x
\right) -
1}{\sinh \left( x \right) }}}}\sinh \left( x \right) -1 \right)
}}}}
```

"i is", 16,

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

$$l := 0$$

$$u := \infty$$

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

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

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

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

$$"\text{F(x)}", \frac{\mathrm{e}^{-\frac{\mathrm{e}^{-1}\sqrt{x+1}}{\sqrt{x-1}}}\sqrt{x+1}}{\sqrt{x-1}}$$

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

$$"\text{S(x)}", \frac{-\mathrm{e}^{-\frac{\mathrm{e}^{-1}\sqrt{x+1}}{\sqrt{x-1}}}\sqrt{x+1}+\sqrt{x-1}}{\sqrt{x-1}}$$

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

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

$$\int_{1}^{\frac{\mathrm{e}^2+1}{\mathrm{e}^2-1}}\frac{x^2\left(\mathrm{e}^{-1+\operatorname{arctanh}\left(\frac{1}{x}\right)}-1\right)\mathrm{e}^{-\mathrm{e}^{-1+\operatorname{arctanh}\left(\frac{1}{x}\right)}+\operatorname{arctanh}\left(\frac{1}{x}\right)}}{x^2-1}\,\mathrm{d}x$$

$$-\left(\int_{1}^{\frac{\mathrm{e}^2+1}{\mathrm{e}^2-1}}\frac{x\left(\mathrm{e}^{-1+\operatorname{arctanh}\left(\frac{1}{x}\right)}-1\right)\mathrm{e}^{-\mathrm{e}^{-1+\operatorname{arctanh}\left(\frac{1}{x}\right)}+\operatorname{arctanh}\left(\frac{1}{x}\right)}}{x^2-1}\,\mathrm{d}x\right)^2$$

$$mf := \int_{1}^{\frac{\mathrm{e}+\mathrm{e}^{-1}}{\mathrm{e}-\mathrm{e}^{-1}}}\frac{x^{r\sim}\left(\mathrm{e}^{-1+\operatorname{arctanh}\left(\frac{1}{x}\right)}-1\right)\mathrm{e}^{-\mathrm{e}^{-1+\operatorname{arctanh}\left(\frac{1}{x}\right)}+\operatorname{arctanh}\left(\frac{1}{x}\right)}}{x^2-1}\,\mathrm{d}x$$

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

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

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

"i is", 17,

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

$$l := 0$$

$$u := \infty$$

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

"l and u", 0, ∞

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

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

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

"IDF(x)", $\left[\left[s \rightarrow -\frac{2\,\operatorname{LambertW}\left(-e^{-1} s\right) e}{e^{2}\operatorname{LambertW}\left(-e^{-1} s\right)^{2}-1}\right], [0, 1], ["Continuous", "IDF"]\right]$

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

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

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

$$\int_{0}^{\frac{2\,\mathrm{e}}{\mathrm{e}^{2}-1}} \frac{\left(\mathrm{e}^{-1+\operatorname{arcsinh}\left(\frac{1}{x}\right)}-1\right)\mathrm{e}^{-\mathrm{e}^{-1+\operatorname{arcsinh}\left(\frac{1}{x}\right)}+\operatorname{arcsinh}\left(\frac{1}{x}\right)}\,x}{\sqrt{x^{2}+1}}\,\mathrm{d}x$$

$$-\left(\int_{0}^{\frac{2\,\mathrm{e}}{\mathrm{e}^{2}-1}} \frac{\left(\mathrm{e}^{-1+\operatorname{arcsinh}\left(\frac{1}{x}\right)}-1\right)\mathrm{e}^{-\mathrm{e}^{-1+\operatorname{arcsinh}\left(\frac{1}{x}\right)}+\operatorname{arcsinh}\left(\frac{1}{x}\right)}}{\sqrt{x^{2}+1}}\,\mathrm{d}x\right)^{2}$$

$$mf := \int_{0}^{-\frac{2}{-\mathrm{e}+\mathrm{e}^{-1}}} \frac{x^{r\sim}\left(\mathrm{e}^{-1+\operatorname{arcsinh}\left(\frac{1}{x}\right)}-1\right)\mathrm{e}^{-\mathrm{e}^{-1+\operatorname{arcsinh}\left(\frac{1}{x}\right)}+\operatorname{arcsinh}\left(\frac{1}{x}\right)}}{\sqrt{x^{2}+1}\;|x|}\,\mathrm{d}x$$

$$\text{"MF"},\ \int_{0}^{-\frac{2}{-\mathrm{e}+\mathrm{e}^{-1}}} \frac{x^{r\sim}\left(\mathrm{e}^{-1+\operatorname{arcsinh}\left(\frac{1}{x}\right)}-1\right)\mathrm{e}^{-\mathrm{e}^{-1+\operatorname{arcsinh}\left(\frac{1}{x}\right)}+\operatorname{arcsinh}\left(\frac{1}{x}\right)}}{\sqrt{x^{2}+1}\;|x|}\,\mathrm{d}x$$

$$\text{"MGF"},\ \int_{0}^{\frac{2\,\mathrm{e}}{\mathrm{e}^{2}-1}} \frac{\left(\mathrm{e}^{-1+\operatorname{arcsinh}\left(\frac{1}{x}\right)}-1\right)\mathrm{e}^{t\,x-\mathrm{e}^{-1+\operatorname{arcsinh}\left(\frac{1}{x}\right)}+\operatorname{arcsinh}\left(\frac{1}{x}\right)}}{\sqrt{x^{2}+1}\;x}\,\mathrm{d}x$$

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

"i is", 18,

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

$$l := 0$$

$$u := \infty$$

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

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

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

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

$$\text{"F(x)"}, \mathrm{e}^{\frac{1}{2}\left(-2\,\mathrm{e}^{\frac{1}{2}\frac{\mathrm{e}^{\frac{1}{x}}x-2x+2}{x}}+\mathrm{e}^{\frac{1}{2}\frac{\left(x+4\,\mathrm{e}^{\frac{1}{x}}\right)\mathrm{e}^{-\frac{1}{x}}}{x}}-\mathrm{e}^{\frac{1}{2}}\mathrm{e}^{-\frac{1}{x}}\right)\mathrm{e}^{-\frac{1}{2}\frac{\left(x+2\,\mathrm{e}^{\frac{1}{x}}\right)\mathrm{e}^{-\frac{1}{x}}}{x}}}$$

$$\text{"IDF(x)"}, \left[\left[s \rightarrow 1\Big/\left(RootOf\left(2\,\mathrm{e}^{\_Z}\ln(2)-2\,\mathrm{e}^{\_Z}\ln\left(-2\ln(s)\,\mathrm{e}^{\_Z}+\mathrm{e}^{2\_Z}-1\right)+\mathrm{e}^{2\_Z}+2\,\_Z\,\mathrm{e}^{\_Z}-2\,\mathrm{e}^{\_Z}-1\right)\right)\right], [0, 1], [\text{"Continuous"}, \text{"IDF"}]\right]$$

$$\text{"S(x)"}, 1-\mathrm{e}^{\frac{1}{2}\left(-2\,\mathrm{e}^{\frac{1}{2}\frac{\mathrm{e}^{\frac{1}{x}}x-2x+2}{x}}+\mathrm{e}^{\frac{1}{2}\frac{\left(x+4\,\mathrm{e}^{\frac{1}{x}}\right)\mathrm{e}^{-\frac{1}{x}}}{x}}-\mathrm{e}^{\frac{1}{2}}\mathrm{e}^{-\frac{1}{x}}\right)\mathrm{e}^{-\frac{1}{2}\frac{\left(x+2\,\mathrm{e}^{\frac{1}{x}}\right)\mathrm{e}^{-\frac{1}{x}}}{x}}}$$

$$\text{"h(x)"}, -\frac{\left(\mathrm{e}^{-1+\sinh\left(\frac{1}{x}\right)}-1\right)\mathrm{e}^{-\mathrm{e}^{-1+\sinh\left(\frac{1}{x}\right)}+\sinh\left(\frac{1}{x}\right)}\cosh\left(\frac{1}{x}\right)}{x^2\left(-1+\mathrm{e}^{\frac{1}{2}\left(-2\,\mathrm{e}^{\frac{1}{2}\frac{\mathrm{e}^{\frac{1}{x}}x-2x+2}{x}}+\mathrm{e}^{\frac{1}{2}\frac{\left(x+4\,\mathrm{e}^{\frac{1}{x}}\right)\mathrm{e}^{-\frac{1}{x}}}{x}}-\mathrm{e}^{\frac{1}{2}}\mathrm{e}^{-\frac{1}{x}}\right)\mathrm{e}^{-\frac{1}{2}\frac{\left(x+2\,\mathrm{e}^{\frac{1}{x}}\right)\mathrm{e}^{-\frac{1}{x}}}{x}}}\right)}$$

$$\text{"Mean and Variance did not work"}$$

$$mf := \int_0^{\frac{1}{\ln\left(1+\sqrt{2}\right)}} \frac{x^{r\sim}\left(\mathrm{e}^{-1+\sinh\left(\frac{1}{x}\right)}-1\right)\mathrm{e}^{-\mathrm{e}^{-1+\sinh\left(\frac{1}{x}\right)}+\sinh\left(\frac{1}{x}\right)}\cosh\left(\frac{1}{x}\right)}{x^2}\,\mathrm{d}x$$

$$"\mathrm{MF}", \int_0^{\frac{1}{\ln(1+\sqrt{2})}} \frac{x^{r\sim}\left(\mathrm{e}^{-1+\sinh\left(\frac{1}{x}\right)}-1\right)\mathrm{e}^{-\mathrm{e}^{-1+\sinh\left(\frac{1}{x}\right)}+\sinh\left(\frac{1}{x}\right)}\cosh\left(\frac{1}{x}\right)}{x^2}\,\mathrm{d}x$$

"MGF didn't work"

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

"i is", 19,

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

$$l := 0$$

$$u := \infty$$

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

"l and u", 0, ∞

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

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

$$"\mathrm{F(x)}", \int_1^x \frac{\left(t-2+\sqrt{t^2-2\,t+2}\right)\mathrm{e}^{-t+2-\sqrt{t^2-2\,t+2}+\mathrm{arccsch}\left(\frac{1}{t-1}\right)}}{\sqrt{t^2-2\,t+2}}\,\mathrm{d}t$$

"IDF did not work"

$$"\mathrm{S(x)}", 1-\left(\int_1^x \frac{\left(t-2+\sqrt{t^2-2\,t+2}\right)\mathrm{e}^{-t+2-\sqrt{t^2-2\,t+2}+\mathrm{arccsch}\left(\frac{1}{t-1}\right)}}{\sqrt{t^2-2\,t+2}}\,\mathrm{d}t\right)$$

"h(x)",

$$-\left(\left(x-2+\sqrt{x^2-2x+2}\right)\mathrm{e}^{-x+2-\sqrt{x^2-2x+2}+\operatorname{arccsch}\left(\frac{1}{x-1}\right)}\right) \Bigg/ \left(\sqrt{x^2-2x+2}\left(-1+\int_1^x \frac{\left(t-2+\sqrt{t^2-2t+2}\right)\mathrm{e}^{-t+2-\sqrt{t^2-2t+2}+\operatorname{arccsch}\left(\frac{1}{t-1}\right)}}{\sqrt{t^2-2t+2}}\,\mathrm{d}t\right)\right)$$

"mean and variance", $\displaystyle\int_1^{\infty} \frac{x\left(x-2+\sqrt{x^2-2x+2}\right)\mathrm{e}^{-x+2-\sqrt{x^2-2x+2}+\operatorname{arccsch}\left(\frac{1}{x-1}\right)}}{\sqrt{x^2-2x+2}}\,\mathrm{d}x,$

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

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

$$mf := \int_1^{\infty} \frac{x^{r\sim}\left(x-2+\sqrt{x^2-2x+2}\right)\mathrm{e}^{-x+2-\sqrt{x^2-2x+2}+\operatorname{arccsch}\left(\frac{1}{x-1}\right)}}{\sqrt{x^2-2x+2}}\,\mathrm{d}x$$

"MF", $\displaystyle\int_1^{\infty} \frac{x^{r\sim}\left(x-2+\sqrt{x^2-2x+2}\right)\mathrm{e}^{-x+2-\sqrt{x^2-2x+2}+\operatorname{arccsch}\left(\frac{1}{x-1}\right)}}{\sqrt{x^2-2x+2}}\,\mathrm{d}x$

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

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

"i is", 20,

" ---"

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

$$l := 0$$

$$u := \infty$$

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

$$"l and u", 0, \infty$$

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

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

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

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

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

$$"h(x)", \left(\left(e^{\frac{1}{\operatorname{arctanh}(x)}} - 1\right) e^{-\frac{e^{\frac{1}{\operatorname{arctanh}(x)}} \operatorname{arctanh}(x) - \operatorname{arctanh}(x) - 1}{\operatorname{arctanh}(x)}}\right) \Bigg/ \left(\operatorname{arctanh}(x)^2 \left(x^2 - 1\right) \left((1 - x)^{\frac{e^{\frac{2}{\ln(x+1) - \ln(1-x)}} - 1}{\ln(x+1) - \ln(1-x)}} (x + 1)^{-\frac{e^{\frac{2}{\ln(x+1) - \ln(1-x)}} - 1}{\ln(x+1) - \ln(1-x)}} e^{\frac{2}{\ln(x+1) - \ln(1-x)}} - 1\right)\right)$$

$$"mean and variance", -\left(\int_0^1 \frac{x \left(e^{\frac{1}{\operatorname{arctanh}(x)}} - 1\right) e^{-\frac{e^{\frac{1}{\operatorname{arctanh}(x)}} \operatorname{arctanh}(x) - \operatorname{arctanh}(x) - 1}{\operatorname{arctanh}(x)}}}{\operatorname{arctanh}(x)^2 \left(x^2 - 1\right)} \, dx\right), -\Bigg($$

$$\int_0^1 \frac{x^2 \left(e^{\frac{1}{\operatorname{arctanh}(x)}} - 1\right) e^{-\frac{e^{\frac{1}{\operatorname{arctanh}(x)}} \operatorname{arctanh}(x) - \operatorname{arctanh}(x) - 1}{\operatorname{arctanh}(x)}}}{\operatorname{arctanh}(x)^2 (x^2 - 1)} \, dx\Bigg)$$

$$-\left(\int_0^1 \frac{x \left(e^{\frac{1}{\operatorname{arctanh}(x)}} - 1\right) e^{-\frac{e^{\frac{1}{\operatorname{arctanh}(x)}} \operatorname{arctanh}(x) - \operatorname{arctanh}(x) - 1}{\operatorname{arctanh}(x)}}}{\operatorname{arctanh}(x)^2 (x^2 - 1)} \, dx\right)^2$$

$$mf := \int_0^1 \left(-\frac{x^{r\sim} \left(e^{\frac{1}{\operatorname{arctanh}(x)}} - 1\right) e^{-\frac{e^{\frac{1}{\operatorname{arctanh}(x)}} \operatorname{arctanh}(x) - \operatorname{arctanh}(x) - 1}{\operatorname{arctanh}(x)}}}{\operatorname{arctanh}(x)^2 (x^2 - 1)}\right) dx$$

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

$$\text{"MGF"}, -\left(\int_0^1 \frac{\left(e^{\frac{1}{\operatorname{arctanh}(x)}} - 1\right) e^{-\frac{-t\,x \operatorname{arctanh}(x) + e^{\frac{1}{\operatorname{arctanh}(x)}} \operatorname{arctanh}(x) - \operatorname{arctanh}(x) - 1}{\operatorname{arctanh}(x)}}}{\operatorname{arctanh}(x)^2 (x^2 - 1)} \, dx\right)$$

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

"i is", 21,

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

$$l := 0$$

$$u := \infty$$

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

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

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

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

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

$$"\text{F(x)}", \int_0^x \frac{\left(e^{\frac{1}{\operatorname{arccsch}(t)}} - 1\right) e^{-\frac{e^{\frac{1}{\operatorname{arccsch}(t)}}\operatorname{arccsch}(t) - \operatorname{arccsch}(t) - 1}{\operatorname{arccsch}(t)}}}{\sqrt{t^2+1}\,\operatorname{arccsch}(t)^2\,|t|}\,dt$$

$$"\text{IDF did not work}"$$

$$"\text{S(x)}", 1 - \left(\int_0^x \frac{\left(e^{\frac{1}{\operatorname{arccsch}(t)}} - 1\right) e^{-\frac{e^{\frac{1}{\operatorname{arccsch}(t)}}\operatorname{arccsch}(t) - \operatorname{arccsch}(t) - 1}{\operatorname{arccsch}(t)}}}{\sqrt{t^2+1}\,\operatorname{arccsch}(t)^2\,|t|}\,dt\right)$$

"h(x)",

$$-\left(\left(e^{\frac{1}{\operatorname{arccsch}(x)}} - 1\right) e^{-\frac{e^{\frac{1}{\operatorname{arccsch}(x)}}\operatorname{arccsch}(x) - \operatorname{arccsch}(x) - 1}{\operatorname{arccsch}(x)}}\right) \Bigg/ \left(\sqrt{x^2+1}\,\operatorname{arccsch}(x)^2\,|x| \left(-1 + \int_0^x \frac{\left(e^{\frac{1}{\operatorname{arccsch}(t)}} - 1\right) e^{-\frac{e^{\frac{1}{\operatorname{arccsch}(t)}}\operatorname{arccsch}(t) - \operatorname{arccsch}(t) - 1}{\operatorname{arccsch}(t)}}}{\sqrt{t^2+1}\,\operatorname{arccsch}(t)^2\,|t|}\,dt\right.\right.$$

$$\left.\left. \mathrm{d}t \right)\right)$$

$$\text{"mean and variance"}, \int_0^{\infty} \frac{\left(\mathrm{e}^{\frac{1}{\operatorname{arccsch}(x)}} - 1\right) \mathrm{e}^{-\frac{\mathrm{e}^{\frac{1}{\operatorname{arccsch}(x)}} \operatorname{arccsch}(x) - \operatorname{arccsch}(x) - 1}{\operatorname{arccsch}(x)}}}{\sqrt{x^2+1}\ \operatorname{arccsch}(x)^2} \,\mathrm{d}x,$$

$$\int_0^{\infty} \frac{x \left(\mathrm{e}^{\frac{1}{\operatorname{arccsch}(x)}} - 1\right) \mathrm{e}^{-\frac{\mathrm{e}^{\frac{1}{\operatorname{arccsch}(x)}} \operatorname{arccsch}(x) - \operatorname{arccsch}(x) - 1}{\operatorname{arccsch}(x)}}}{\sqrt{x^2+1}\ \operatorname{arccsch}(x)^2} \,\mathrm{d}x$$

$$- \left(\int_0^{\infty} \frac{\left(\mathrm{e}^{\frac{1}{\operatorname{arccsch}(x)}} - 1\right) \mathrm{e}^{-\frac{\mathrm{e}^{\frac{1}{\operatorname{arccsch}(x)}} \operatorname{arccsch}(x) - \operatorname{arccsch}(x) - 1}{\operatorname{arccsch}(x)}}}{\sqrt{x^2+1}\ \operatorname{arccsch}(x)^2} \,\mathrm{d}x \right)^2$$

$$mf := \int_0^{\infty} \frac{x^{r\sim} \left(\mathrm{e}^{\frac{1}{\operatorname{arccsch}(x)}} - 1\right) \mathrm{e}^{-\frac{\mathrm{e}^{\frac{1}{\operatorname{arccsch}(x)}} \operatorname{arccsch}(x) - \operatorname{arccsch}(x) - 1}{\operatorname{arccsch}(x)}}}{\sqrt{x^2+1}\ \operatorname{arccsch}(x)^2\, |x|} \,\mathrm{d}x$$

$$\text{"MF"}, \int_0^{\infty} \frac{x^{r\sim} \left(\mathrm{e}^{\frac{1}{\operatorname{arccsch}(x)}} - 1\right) \mathrm{e}^{-\frac{\mathrm{e}^{\frac{1}{\operatorname{arccsch}(x)}} \operatorname{arccsch}(x) - \operatorname{arccsch}(x) - 1}{\operatorname{arccsch}(x)}}}{\sqrt{x^2+1}\ \operatorname{arccsch}(x)^2\, |x|} \,\mathrm{d}x$$

$$\text{"MGF"}, \int_0^{\infty} \frac{\left(\mathrm{e}^{\frac{1}{\operatorname{arccsch}(x)}} - 1\right) \mathrm{e}^{-\frac{-t\,x \operatorname{arccsch}(x) + \mathrm{e}^{\frac{1}{\operatorname{arccsch}(x)}} \operatorname{arccsch}(x) - \operatorname{arccsch}(x) - 1}{\operatorname{arccsch}(x)}}}{\sqrt{x^2+1}\ \operatorname{arccsch}(x)^2\, x} \,\mathrm{d}x$$

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

```
\left(x\right) \right) ^{-1}}}{\rm arccsch} \left(x\right)-
{\rm arccsch} \left(x\right)-1}{{\rm arccsch} \left(x\right)}}}}
}
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"i is", 22,

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

$$l := 0$$

$$u := \infty$$

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

"l and u", 0, ∞

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

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

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

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

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

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

"mean and variance", $\int_{0}^{\infty} x \left(e^{\sinh(x)} - 1\right) e^{-e^{\sinh(x)} + \sinh(x) + 1} \cosh(x)\, dx$,

$\int_{0}^{\infty} \cosh(x)\, x^{2} \left(e^{-e^{\sinh(x)} + 2\sinh(x) + 1} - e^{-e^{\sinh(x)} + \sinh(x) + 1}\right) dx - \left(\int_{0}^{\infty} x \left(e^{\sinh(x)} - 1\right) e^{-e^{\sinh(x)} + \sinh(x) + 1} \cosh(x)\, dx\right)^{2}$

$$mf := \int_{0}^{\infty} x^{r\sim} \left(e^{\sinh(x)} - 1\right) e^{-e^{\sinh(x)} + \sinh(x) + 1} \cosh(x)\, dx$$

"MF", $\int_{0}^{\infty} x^{r\sim} \left(e^{\sinh(x)} - 1\right) e^{-e^{\sinh(x)} + \sinh(x) + 1} \cosh(x)\, dx$

"MGF", $\int_{0}^{\infty} \left(e^{\sinh(x)} - 1\right) \cosh(x)\, e^{t x - e^{\sinh(x)} + \sinh(x) + 1}\, dx$

```
 \left( {{\rm e}^{\sinh \left( x \right) }}-1 \right) {{\rm e}^
{-{
```

```
{\rm e}^{\sinh \left( x \right) }}+\sinh \left( x \right) +1}}
\cosh
 \left( x \right)
```