```
> 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 := MakehamRV(1, 2, 2);
  bfname := "MakehamRV(1, 2, 2)";
```

$$bf := \left[\left[x \rightarrow \left(1 + 2\,2^x\right) e^{-x - \frac{2\left(2^x - 1\right)}{\ln(2)}}\right], [0, \infty], ["Continuous", "PDF"]\right]$$

$$bfname := "MakehamRV(1, 2, 2)" \tag{1}$$

```
> #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:/Latex_Output_2/Makeham.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=1 then print("IDF did not work") elif 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=16 then print("IDF did not
work") elif i=17 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=13 then print("Mean and Variance did not work") elif i=22
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);
  print("MGF", MGF(Temp));
  #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 = ", 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(" $$F^{-1} = ");
    if i=1 then print("Unable to find IDF") elif i=11 then print
  ("Unable to find IDF") elif i=12 then print("Unable to find IDF")
  elif i=14 then print("Unable to find IDF") elif i=16 then print
  ("Unable to find IDF") elif i=17 then print("Unable to find IDF")
  elif i=19 then print("Unable to find IDF") elif i=21 then print
  ("Unable to find IDF") else latex(IDF(Temp)[1]) end if;
    printf("$$");
    printf("Survivor Function \n $$ S(x)=");
    latex(SF(Temp, x));
    printf("$$ Hazard Function \n $$ h(x)=");
    latex(HF(Temp,x));
    printf("$$");
    printf("Mean \n $$ \mu=");
    if i=13 then print("Unable to find Mean") elif i=22 then print
  ("Unable to find Mean") else latex(Mean(Temp)) end if;
    printf("$$ Variance \n $$ \sigma^2 = ");
    if i=13 then print("Unable to find Variance") elif i=22 then
  print("Unable to find Variance") else latex(Variance(Temp)) end
  if;
    printf("$$");
    printf("Moment Function \n $$ m(x) = ");
    latex(mf);
    printf("$$ Moment Generating Function \n $$");
    latex(MGF(Temp)[1]);
    printf("$$");
    #latex(MGF(Temp)[1]);

    writeto(terminal);


  od;

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

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

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

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

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

$$l := 0$$

$$u := \infty$$

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

"l and u", 0, ∞

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

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

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

"IDF did not work"

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

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

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

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

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

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

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

"i is", 2,

"---"

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

$$l := 0$$

$$u := \infty$$

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

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

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

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

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

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

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

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

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

$$\int_0^{\infty} 2\,x^3\,\mathrm{e}^{-\frac{x^2\ln(2)+2^{x^2+1}-2}{\ln(2)}}\left(1+2^{x^2+1}\right)\,\mathrm{d}x-\left(\int_0^{\infty} 2\,x^2\,\mathrm{e}^{-\frac{x^2\ln(2)+2^{x^2+1}-2}{\ln(2)}}\left(1+2^{x^2+1}\right)\,\mathrm{d}x\right)^2$$

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

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

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

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

"i is", 3,

" --"

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

$$l := 0$$

$$u := \infty$$

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

"l and u", 0, ∞

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

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

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

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

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

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

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

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

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

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

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

"i is", 4,

" --"

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

$$l:=0$$

$$u:=\infty$$

$$Temp:=\left[\left[y\sim\to\left(1+\tan(y\sim)^{2}\right)\mathrm{e}^{-\frac{\tan(y\sim)\ln(2)+2^{1+\tan(y\sim)}-2}{\ln(2)}}\left(1+2^{1+\tan(y\sim)}\right)\right],\left[0,\frac{1}{2}\pi\right],\right.$$

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

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

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

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

$$\text{"F(x)"}, \begin{cases} 1-\mathrm{e}^{-\frac{\tan(x)\,\ln(2)+2^{1+\tan(x)}-2}{\ln(2)}} & x \le \frac{1}{2}\,\pi \\ \infty & \frac{1}{2}\,\pi < x \end{cases}$$

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

$$\text{"S(x)"}, \begin{cases} \mathrm{e}^{-\frac{\tan(x)\,\ln(2)+2^{1+\tan(x)}-2}{\ln(2)}} & x \le \frac{1}{2}\,\pi \\ -\infty & \frac{1}{2}\,\pi < x \end{cases}$$

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

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

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

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

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

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

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

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

"i is", 5,

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

$$g := t \rightarrow \mathrm{e}^t$$

$$l := 0$$

$$u := \infty$$

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

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

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

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

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

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

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

$$\text{"h(x)"}, \frac{1+2\,x^{\ln(2)}}{x}$$

$$\text{"mean and variance"}, \frac{e^{\frac{2}{\ln(2)}}\,\mathrm{Ei}\left(1, \frac{2}{\ln(2)}\right)+\ln(2)}{\ln(2)}, -\frac{1}{\ln(2)^2}\left(\left(e^{\frac{4}{\ln(2)}}\,\mathrm{Ei}\left(1, \frac{2}{\ln(2)}\right)\right)^2 + 2\,e^{\frac{2}{\ln(2)}}\ln(2)\,\mathrm{Ei}\left(1, \frac{2}{\ln(2)}\right) - \left(\int_1^{\infty}\left(e^{-\frac{2\,(x^{\ln(2)}-1)}{\ln(2)}} + 2\,e^{-\frac{2\,(x^{\ln(2)}-1)}{\ln(2)}}\,x^{\ln(2)}\right)\mathrm{d}x\right)\ln(2)^2 + \ln(2)^2\right)$$

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

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

$$\text{"MGF"}, \int_1^{\infty} \frac{e^{\frac{t\,x\ln(2)-2\,x^{\ln(2)}+2}{\ln(2)}}\left(1+2\,x^{\ln(2)}\right)}{x^2}\,\mathrm{d}x$$

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

"i is", 6,

" --"

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

$$l := 0$$

$$u := \infty$$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

"i is", 7,

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

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

$$l := 0$$

$$u := \infty$$

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

"l and u", 0, ∞

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

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

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

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

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

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

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

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

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

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

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

"i is", 8,

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

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

$$l := 0$$

$$u := \infty$$

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

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

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

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

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

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

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

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

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

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

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

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

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

$$\text{"MGF"}, \int_{-\infty}^{\infty} \left(\mathrm{e}^{-\frac{-t\,x\ln(2) + \mathrm{e}^{-x}\ln(2) + x\ln(2) + 2^{1+\mathrm{e}^{-x}} - 2}{\ln(2)}}\right.$$

$$+2^{1+e^{-x}}\,e^{-\frac{-t x\ln(2)+e^{-x}\ln(2)+x\ln(2)+2^{1+e^{-x}}-2}{\ln(2)}}\Bigg)\,dx$$

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

"i is", 9,

" ---"

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

$$l := 0$$

$$u := \infty$$

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

"l and u", 0, ∞

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

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

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

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

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

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

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

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

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

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

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

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

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

"i is", 10,

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

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

$$l := 0$$

$$u := \infty$$

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

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

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

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

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

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

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

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

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

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

$$-\frac{1}{4}\left(\int_{0}^{\frac{1}{\ln(2)}} \frac{\mathrm{e}^{-\frac{\mathrm{e}^{\frac{1}{x}}\ln(2)x - 2x\ln(2) + 2^{-1+\mathrm{e}^{\frac{1}{x}}}x - \ln(2) - 2x}{\ln(2)x}}\left(2 + 2^{\mathrm{e}^{\frac{1}{x}}}\right)}{x}\,\mathrm{d}x\right)^{2}$$

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

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

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

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

 \left( 2 \right) }}}}}
```

"i is", 11,

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

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

$$l := 0$$

$$u := \infty$$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

"i is", 12,

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

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

$$l := 0$$

$$u := \infty$$

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

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

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

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

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

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

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

$$\text{"h(x)"},$$

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

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

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

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

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

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

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

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

"i is", 13,

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

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

$$l := 0$$

$$u := \infty$$

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

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

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

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

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

$$\text{"IDF(x)"}, \left[\left[s \rightarrow RootOf\left(e^{\frac{1}{2}\,\frac{-e^{\_Z}\ln(2)-2^{2-\frac{1}{2}e^{-\_Z}+\frac{1}{2}e^{\_Z}}+4+e^{-\_Z}\ln(2)}{\ln(2)}}-1+s\right)\right], [0, 1],\right.$$

["Continuous", "IDF"]]

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

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

"Mean and Variance did not work"

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

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

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

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

"i is", 14,

" --"

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

$$l := 0$$

$$u := \infty$$

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

["Continuous", "PDF"]]

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

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

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

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

"IDF did not work"

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

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

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

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

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

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

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

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

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

"i is", 15,

"--"

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

$$l := 0$$

$$u := \infty$$

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

"l and u", 0, ∞

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

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

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

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

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

"h(x)",

$$\left(\cosh(x)\, e^{\frac{1}{\ln(2)\left(e^{2x}-1\right)\sinh(x)}\left(2e^{x}\ln(2)\sinh(x)+\sinh(x)\ln(2)e^{2x}+e^{2x}4^{\frac{e^{x}}{e^{2x}-1}}\sinh(x)-2^{\frac{1}{\sinh(x)}}\sinh(x)e^{2x}-e^{2x}\ln(2)+2\sinh(x)e^{2x}+2^{\frac{1}{\sinh(x)}}\sinh(x)+\ln(2)\right)}\left(1+2^{\frac{1}{\sinh(x)}}\right)\right) \Big/ \left(\sinh(x)^{2}\left(e^{\frac{e^{2x}4^{\frac{e^{x}}{e^{2x}-1}}+2e^{x}\ln(2)+\ln(2)+2}{\ln(2)\left(e^{2x}-1\right)}}-e^{\frac{e^{2x}\ln(2)+4^{\frac{e^{x}}{e^{2x}-1}}+2e^{2x}}{\ln(2)\left(e^{2x}-1\right)}}\right)\right)$$

"mean and variance",

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

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

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

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

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

"MGF",

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

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

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

"i is", 16,

" ---

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

$$l := 0$$

$$u := \infty$$

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

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

"l and u", 0, ∞

"g(x)", $\frac{1}{\tanh(x+1)}$, "base", $(1 + 2\,2^x)\, e^{-x - \frac{2(2^x - 1)}{\ln(2)}}$, "MakehamRV(1, 2, 2)"

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

"F(x)", $\int_1^x \frac{e^{\frac{\ln(2) - 2^{\operatorname{arctanh}\left(\frac{1}{t}\right)} + 2}{\ln(2)}} \operatorname{signum}(t) \left(1 + 2^{\operatorname{arctanh}\left(\frac{1}{t}\right)}\right)}{\sqrt{t^2 - 1}\,(t + 1)}\, dt$

"IDF did not work"

"S(x)", $1 - \left(\int_1^x \frac{e^{\frac{\ln(2) - 2^{\operatorname{arctanh}\left(\frac{1}{t}\right)} + 2}{\ln(2)}} \operatorname{signum}(t) \left(1 + 2^{\operatorname{arctanh}\left(\frac{1}{t}\right)}\right)}{\sqrt{t^2 - 1}\,(t + 1)}\, dt\right)$

"h(x)",

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

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

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

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

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

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

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

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

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

"i is", 17,

" --"

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

$$l := 0$$

$$u := \infty$$

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

"l and u", 0, ∞

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

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

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

"IDF did not work"

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

$$"h(x)", -\left(\mathrm{signum}(x)\, \mathrm{e}^{\frac{\ln(2)-2^{\operatorname{arcsinh}\left(\frac{1}{x}\right)}+2}{\ln(2)}}\left(1+2^{\operatorname{arcsinh}\left(\frac{1}{x}\right)}\right)\right) \Bigg/ \left(\sqrt{x^2+1}\left(\sqrt{x^2+1}\ \mathrm{signum}(x)+1\right)\left(-1+\mathrm{e}^{1+\frac{2}{\ln(2)}}\left(\int_0^x \frac{\mathrm{signum}(t)\left(1+2^{\operatorname{arcsinh}\left(\frac{1}{t}\right)}\right)\mathrm{e}^{-\frac{2^{\operatorname{arcsinh}\left(\frac{1}{t}\right)}}{\ln(2)}}}{\sqrt{t^2+1}\left(\sqrt{t^2+1}\ \mathrm{signum}(t)+1\right)}\, \mathrm{d}t\right)\right)\right)$$

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

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

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

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

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

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

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

"i is", 18,

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

$$l := 0$$

$$u := \infty$$

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

"l and u", 0, ∞

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

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

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

$$\text{"IDF(x)"}, \left[\left[s \to RootOf\left(-e^{-\frac{1}{2}\,\frac{e^{\frac{1}{\_Z}}\ln(2)-\ln(2)\,e^{-\frac{1}{\_Z}}-2\ln(2)+2^{1+\frac{1}{2}e^{\frac{1}{\_Z}}-\frac{1}{2}e^{-\frac{1}{\_Z}}}-4}{\ln(2)}}+s\right)\right],\right.$$

$$\left.[0, 1], [\text{"Continuous"}, \text{"IDF"}]\right]$$

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

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

"mean and variance",

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

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

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

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

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

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

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

"i is", 19,

" ---"

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

$$l := 0$$

$$u := \infty$$

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

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

"l and u", 0, ∞

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

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

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

"IDF did not work"

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

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

$$\left.+\sqrt{x^2-2x+2}\right)\left(-1+e^{\frac{2}{\ln(2)}}\left(\int_1^x \frac{\left(1+2^{1+\operatorname{arccsch}\left(\frac{1}{t-1}\right)}\right)e^{-\frac{2^{1+\operatorname{arccsch}\left(\frac{1}{t-1}\right)}}{\ln(2)}}}{\sqrt{t^2-2t+2}\left(t-1+\sqrt{t^2-2t+2}\right)}\right.\right.$$

$$\mathrm{d}t\Bigg)\Bigg)\Bigg)$$

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

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

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

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

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

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

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

```
^{-1}
\right)}-2}{\ln  \left( 2 \right) }}}}}
```
"i is", 20,

" --"

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

$$l := 0$$

$$u := \infty$$

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

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

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

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

$$\text{"F(x)"}, (1-x)^{\frac{(x+1)^{\frac{\ln(2)}{\ln(x+1)-\ln(1-x)}}\,(1-x)^{-\frac{\ln(2)}{\ln(x+1)-\ln(1-x)}}\,4^{\frac{1}{\ln(x+1)-\ln(1-x)}} - 2}{(\ln(x+1)-\ln(1-x))\ln(2)}}\,(x+1)^{-\frac{(x+1)^{\frac{\ln(2)}{\ln(x+1)-\ln(1-x)}}\,(1-x)^{-\frac{\ln(2)}{\ln(x+1)-\ln(1-x)}}\,4^{\frac{1}{\ln(x+1)-\ln(1-x)}} - 2}{(\ln(x+1)-\ln(1-x))\ln(2)}}$$

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

$$\text{"IDF(x)"}, \left[\left[s \to RootOf\left(-(1 - \_Z)^{\frac{(1+\_Z)^{\frac{\ln(2)}{\ln(1+\_Z)-\ln(1-\_Z)}}\,(1-\_Z)^{-\frac{\ln(2)}{\ln(1+\_Z)-\ln(1-\_Z)}}\,4^{\frac{1}{\ln(1+\_Z)-\ln(1-\_Z)}} - 2}{(\ln(1+\_Z)-\ln(1-\_Z))\ln(2)}}\,(1+\_Z)\right.\right.\right.$$

$$-\frac{(1+\_Z)^{\frac{\ln(2)}{\ln(1+\_Z)-\ln(1-\_Z)}}\,(1-\_Z)^{-\frac{\ln(2)}{\ln(1+\_Z)-\ln(1-\_Z)}}\,4^{\frac{1}{\ln(1+\_Z)-\ln(1-\_Z)}}-2}{(\ln(1+\_Z)-\ln(1-\_Z))\ln(2)}$$

$$\mathrm{e}^{-\frac{2}{\ln(1+\_Z)-\ln(1-\_Z)}}+s\Bigg)\Bigg)\Bigg], [0, 1], [\text{"Continuous", "IDF"}]\Bigg]$$

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

$$\text{"h(x)"}, \Bigg((x+1)^{-\frac{1}{(\ln(x+1)-\ln(1-x))\ln(2)\,\mathrm{arctanh}(x)}\left(-(x+1)^{\frac{\ln(2)}{\ln(x+1)-\ln(1-x)}}\,(1-x)^{-\frac{\ln(2)}{\ln(x+1)-\ln(1-x)}}\,4^{\frac{1}{\ln(x+1)-\ln(1-x)}}\,\mathrm{arctanh}(x)+\mathrm{arctanh}(x)\,2^{\frac{1+\mathrm{arctanh}(x)}{\mathrm{arctanh}(x)}}+\ln(2)-2\,\mathrm{arctanh}(x)\right)}\,(1-x)^{\frac{\mathrm{arctanh}(x)\,2^{\frac{1+\mathrm{arctanh}(x)}{\mathrm{arctanh}(x)}}+\ln(2)}{(\ln(x+1)-\ln(1-x))\ln(2)\,\mathrm{arctanh}(x)}\,\mathrm{e}^{\frac{2}{\ln(x+1)-\ln(1-x)}}}\left(1+2^{\frac{1+\mathrm{arctanh}(x)}{\mathrm{arctanh}(x)}}\right)\Bigg)\Bigg/\Bigg(\mathrm{arctanh}(x)^2\,(x^2-1)\Bigg(-(1-x)^{\frac{2}{(\ln(x+1)-\ln(1-x))\ln(2)}}\,(x+1)^{\frac{(x+1)^{\frac{\ln(2)}{\ln(x+1)-\ln(1-x)}}\,(1-x)^{-\frac{\ln(2)}{\ln(x+1)-\ln(1-x)}}\,4^{\frac{1}{\ln(x+1)-\ln(1-x)}}}{(\ln(x+1)-\ln(1-x))\ln(2)}\,\mathrm{e}^{\frac{2}{\ln(x+1)-\ln(1-x)}}}+(1-x)^{\frac{(x+1)^{\frac{\ln(2)}{\ln(x+1)-\ln(1-x)}}\,(1-x)^{-\frac{\ln(2)}{\ln(x+1)-\ln(1-x)}}\,4^{\frac{1}{\ln(x+1)-\ln(1-x)}}}{(\ln(x+1)-\ln(1-x))\ln(2)}}\,(x+1)^{\frac{2}{(\ln(x+1)-\ln(1-x))\ln(2)}}\Bigg)\Bigg)$$

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

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

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

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

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

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

"i is", 21,

" --"

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

$$l := 0$$

$$u := \infty$$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

"i is", 22,

" --"

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

$$l := 0$$

$$u := \infty$$

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

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

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

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

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

$$\text{"IDF(x)"}, \left[\left[s \to RootOf\left(e^{\frac{1}{2}\, \frac{-e^{\_Z}\ln(2) - 2^{2 - \frac{1}{2}e^{-\_Z} + \frac{1}{2}e^{\_Z}} + 4 + e^{-\_Z}\ln(2)}{\ln(2)}} - 1 + s\right)\right], [0, 1],$$

["Continuous", "IDF"]]

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

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

"Mean and Variance did not work"

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

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

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

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