

```
> 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, $n \geq r$

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 := HyperExponentialRV([1/2,1/2],[3,4]);
bfname := "HyperExponentialRV([1/2,1/2],[3,4])";
      bf :=  $\left[ \left[ x \rightarrow \frac{3}{2} e^{-3x} + 2 e^{-4x} \right], [0, \infty], ["Continuous", "PDF"] \right]$ 
      bfname := "HyperExponentialRV([1/2,1/2],[3,4])"

```

(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)

```

(2)

```

> # discarded -ln(t + 1), t->csch(t),t->arccsch(t),t -> tan(t),
> #name of the file for latex output
filename := "C:/LatexOutput/Trash.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 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  
  
PlotDist(PDF(Temp), 0, 40);  
PlotDist(HF(Temp), 0, 40);  
  
od;
```

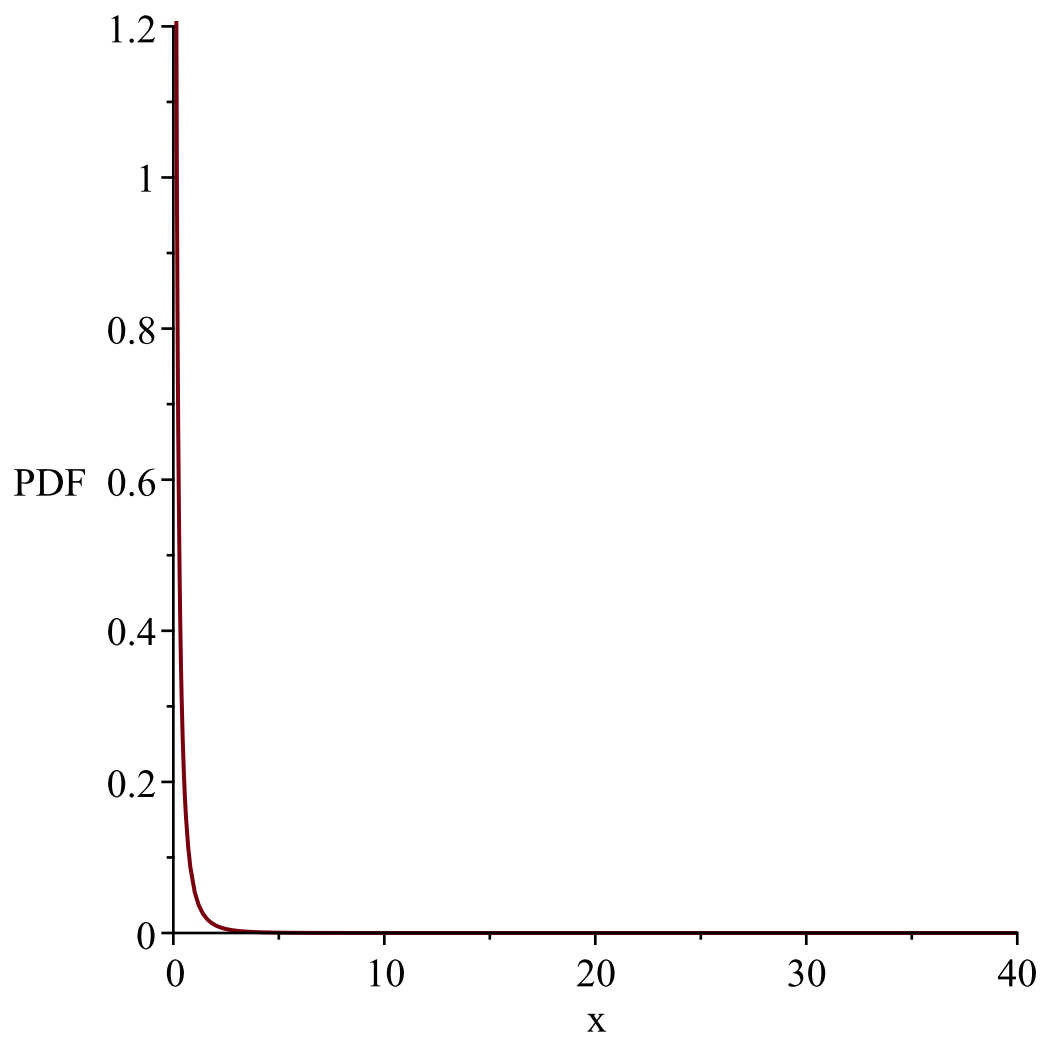
filename := "C:/LatexOutput/Trash.tex"

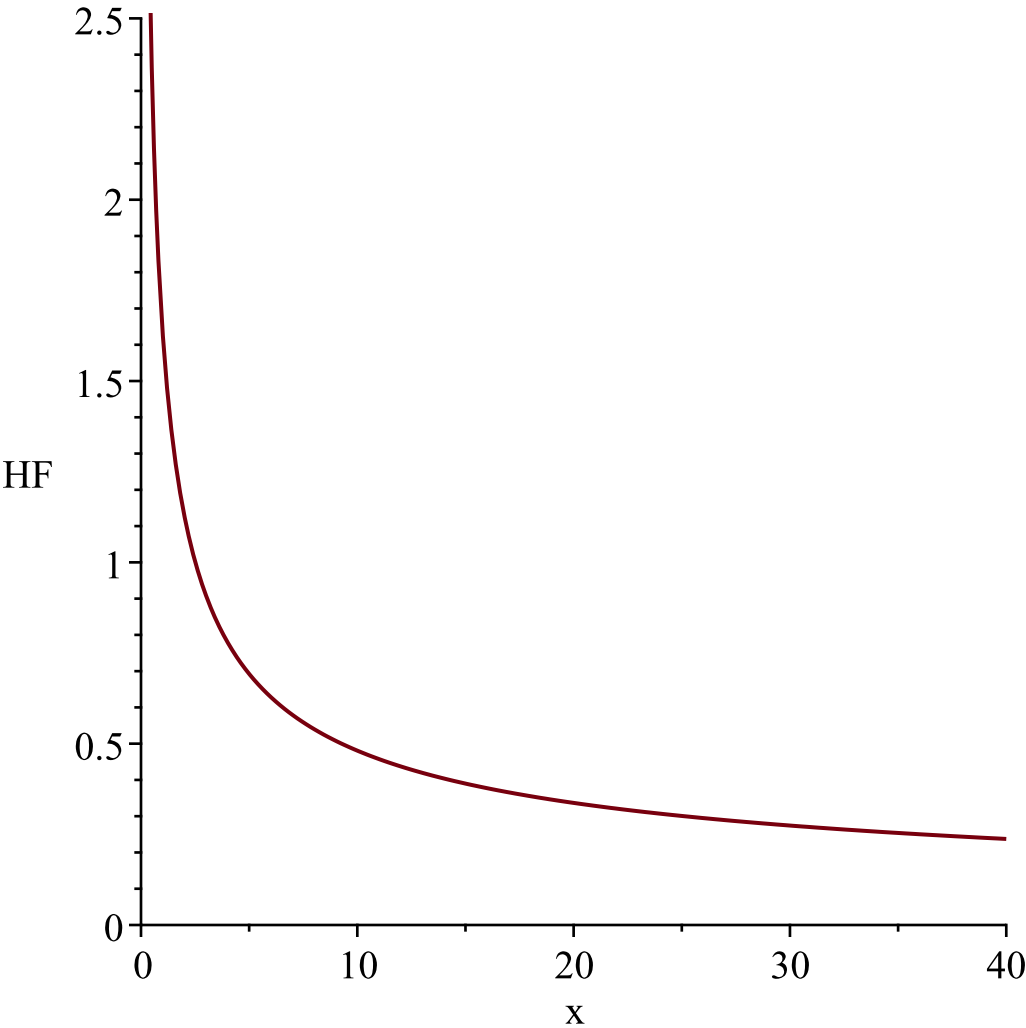
$$\frac{3}{2} e^{-3x} + 2 e^{-4x}$$

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

$$\begin{aligned} g &:= t \rightarrow t^2 \\ l &:= 0 \\ u &:= \infty \end{aligned}$$

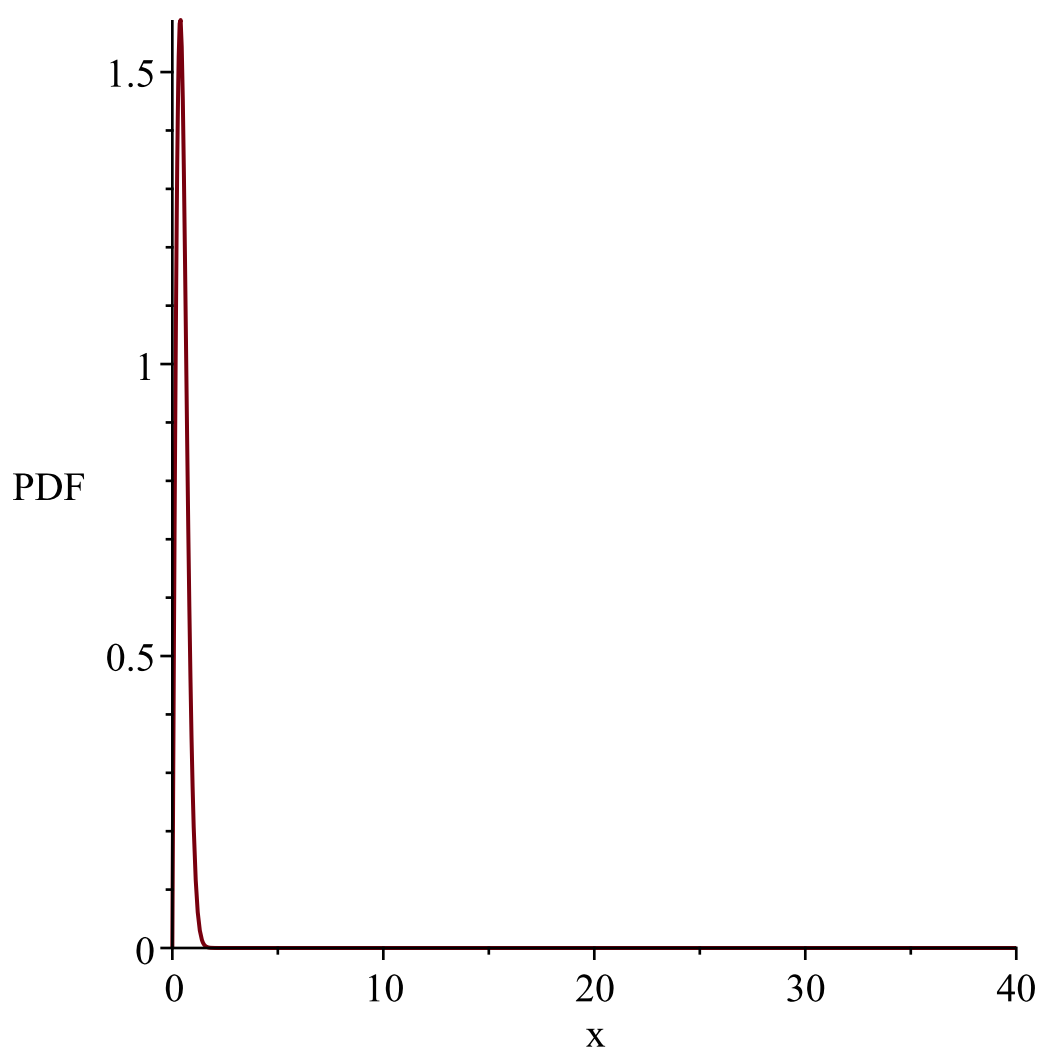
$$Temp := \left[\left[y \rightsquigarrow \frac{1}{4} \frac{e^{-3\sqrt{y}} (4 e^{-\sqrt{y}} + 3)}{\sqrt{y}} \right], [0, \infty], ["Continuous", "PDF"] \right]$$

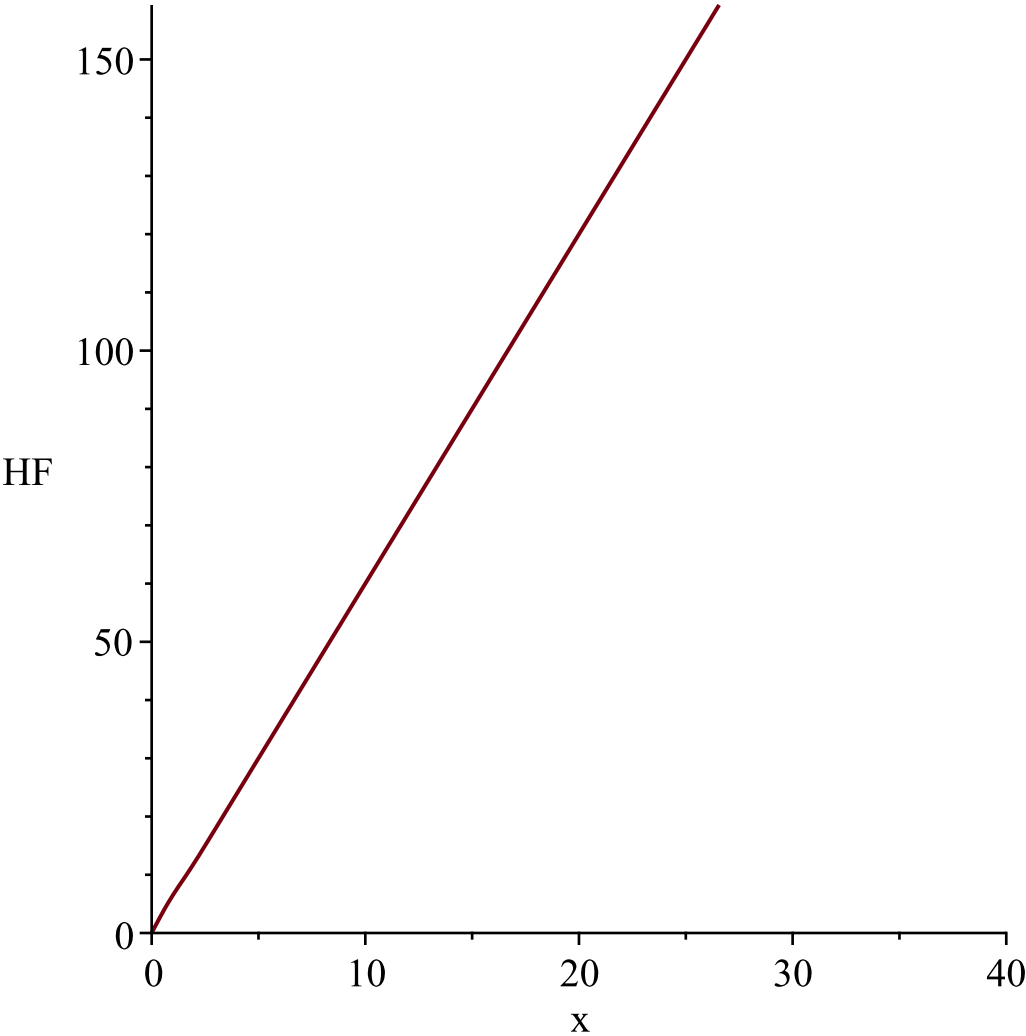




"i is", 2,
" _____"
"-----"

$$\begin{aligned} g &:= t \rightarrow \sqrt{t} \\ l &:= 0 \\ u &:= \infty \\ Temp &:= \left[\left[y \sim \rightarrow e^{-3y^2} \left(3 + 4 e^{-y^2} \right) y \sim \right], [0, \infty], ["Continuous", "PDF"] \right] \end{aligned}$$





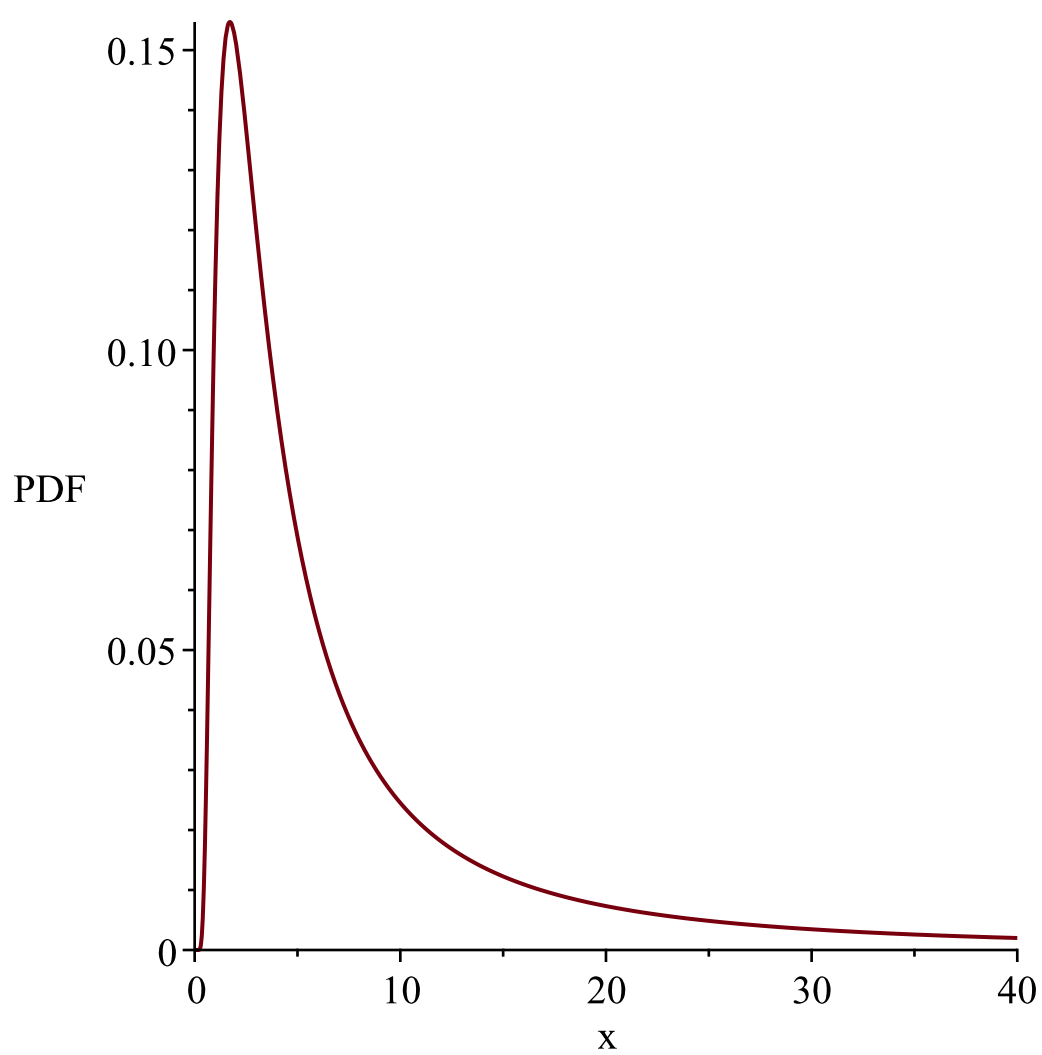
"i is", 3,
" _____"
"_____"

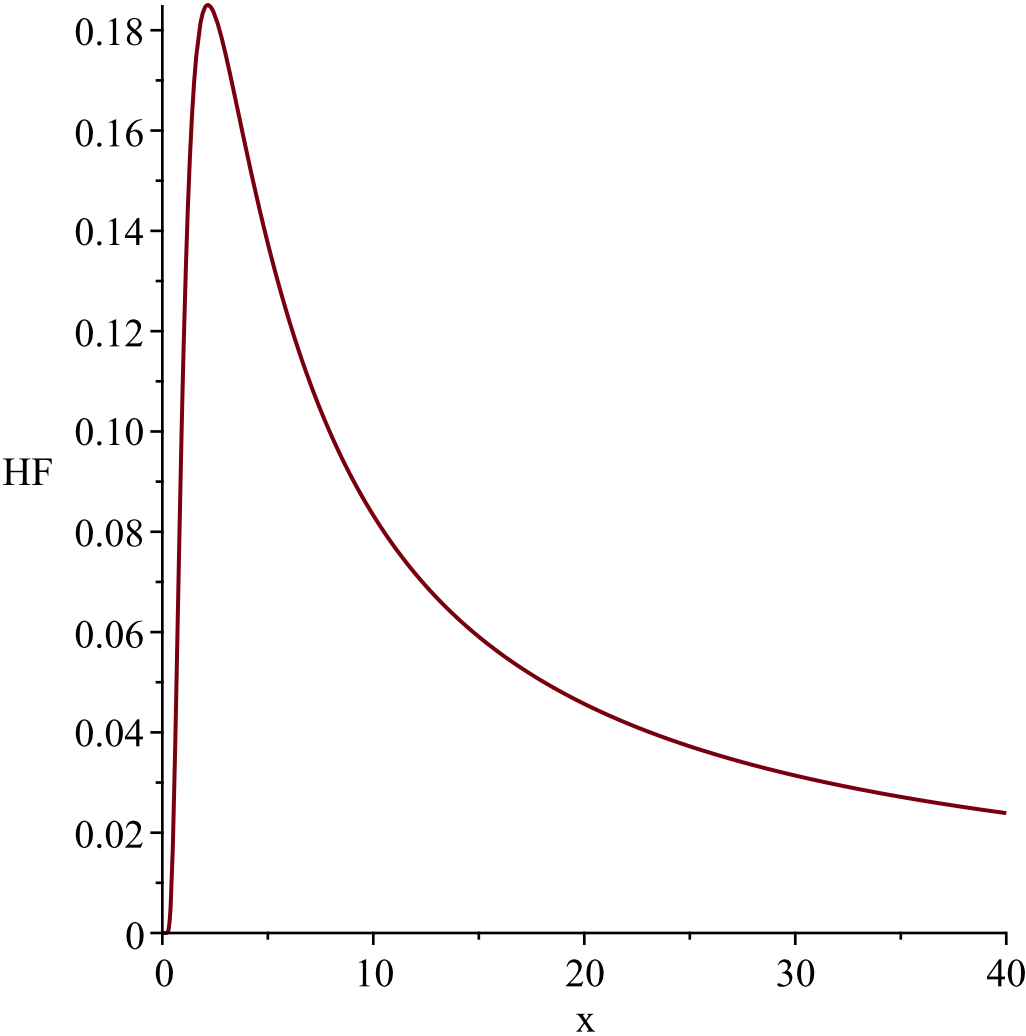
$$g := t \rightarrow \frac{1}{t}$$

$$l := 0$$

$$u := \infty$$

$$Temp := \left[\left[y_{\sim} \rightarrow \frac{1}{2} \frac{e^{-\frac{3}{y_{\sim}}} \left(3 + 4 e^{-\frac{1}{y_{\sim}}} \right)}{y_{\sim}^2}, [0, \infty], ["Continuous", "PDF"] \right]$$

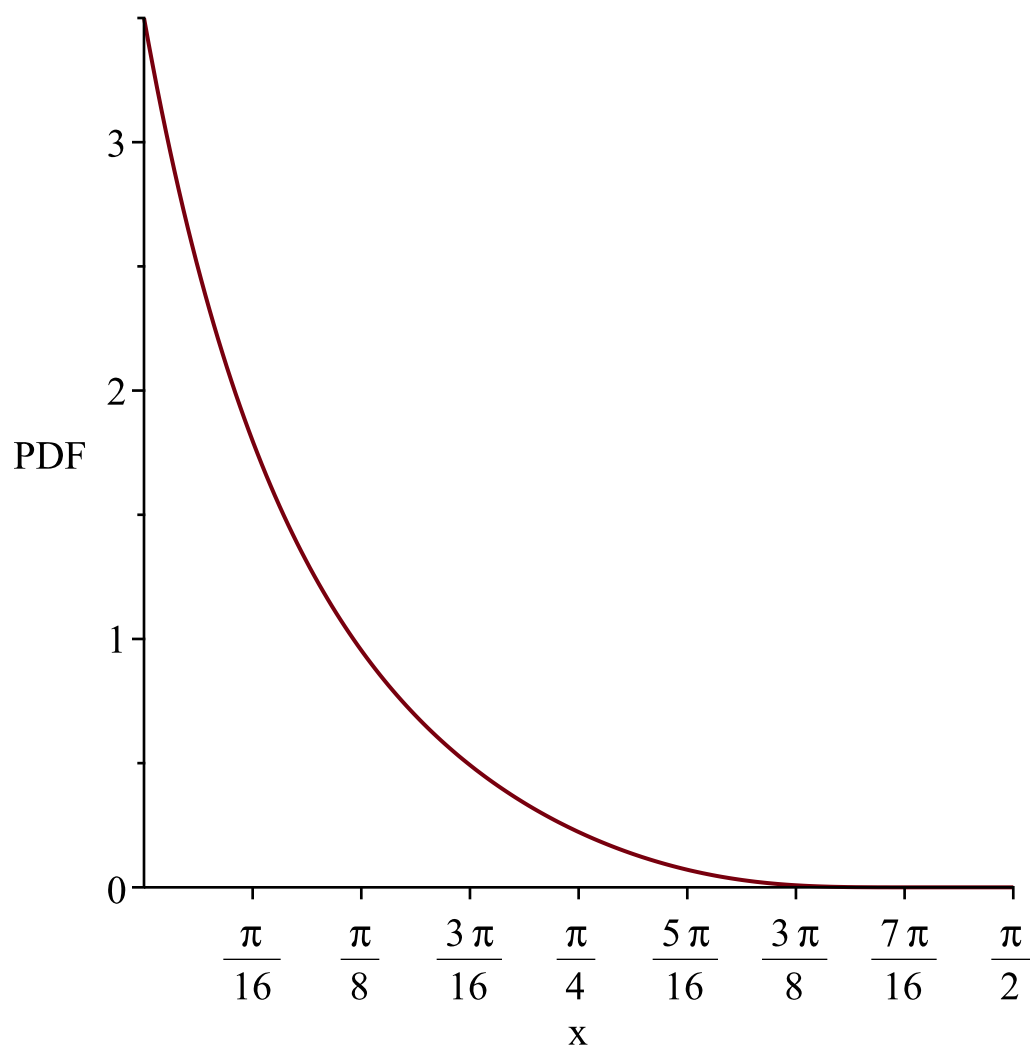




"i is", 4,
"-----"
-----"

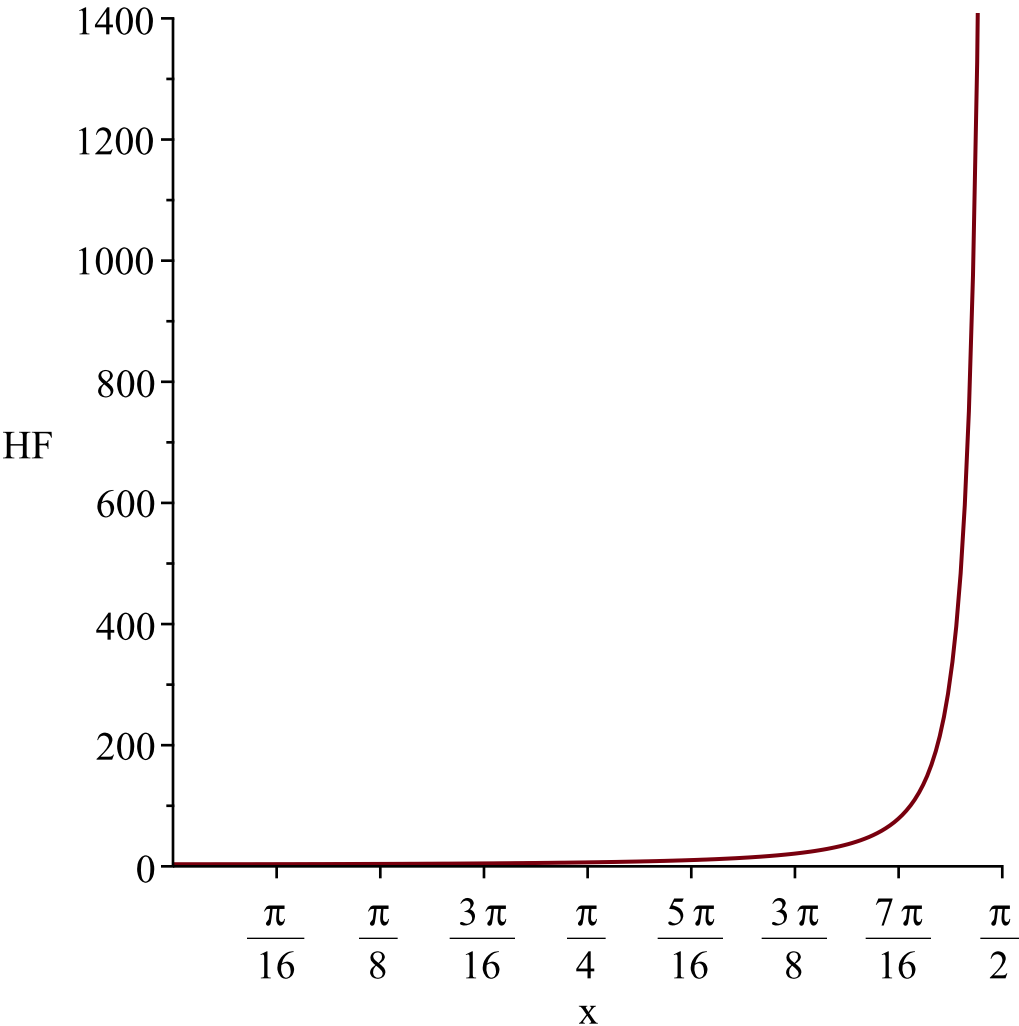
```
g := t→arctan(t)
l := 0
u := ∞
Temp := [[y~→ 1/2 e-3 tan(y~) (3 + 4 e-tan(y~)) (1 + tan(y~)2)], [0, 1/2 π], ["Continuous",
"PDF"]]
```

*WARNING(PlotDist): High value provided by user, 40
is greater than maximum support value of the random
variable, $\frac{1}{2} \pi$
Resetting high to RV's maximum support value*



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

Resetting high to RV's maximum support value



"i is", 5,
"-----"
-----"

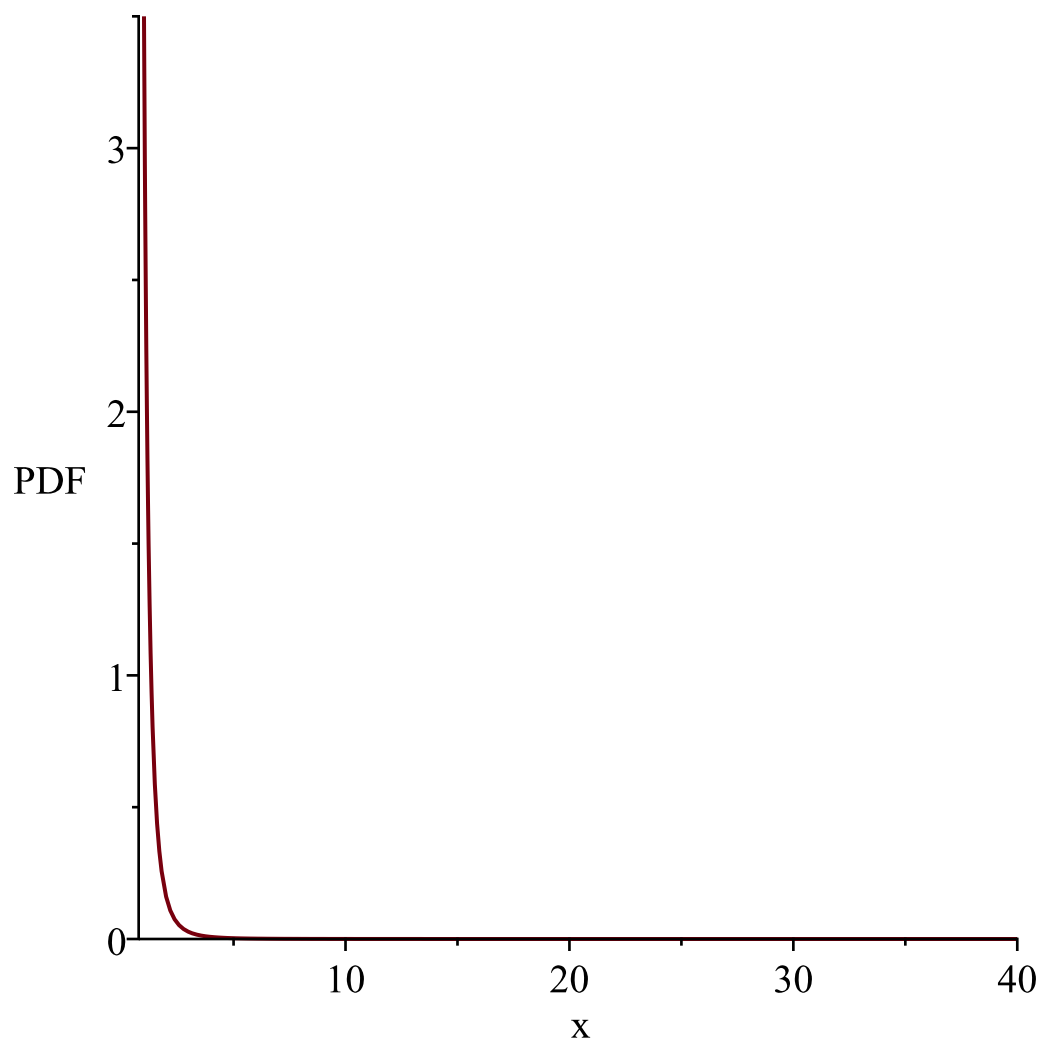
$$g := t \rightarrow e^t$$
$$l := 0$$
$$u := \infty$$

$$Temp := \left[\left[y \sim \frac{1}{2} \frac{3y + 4}{y^5} \right], [1, \infty], ["Continuous", "PDF"] \right]$$

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

1

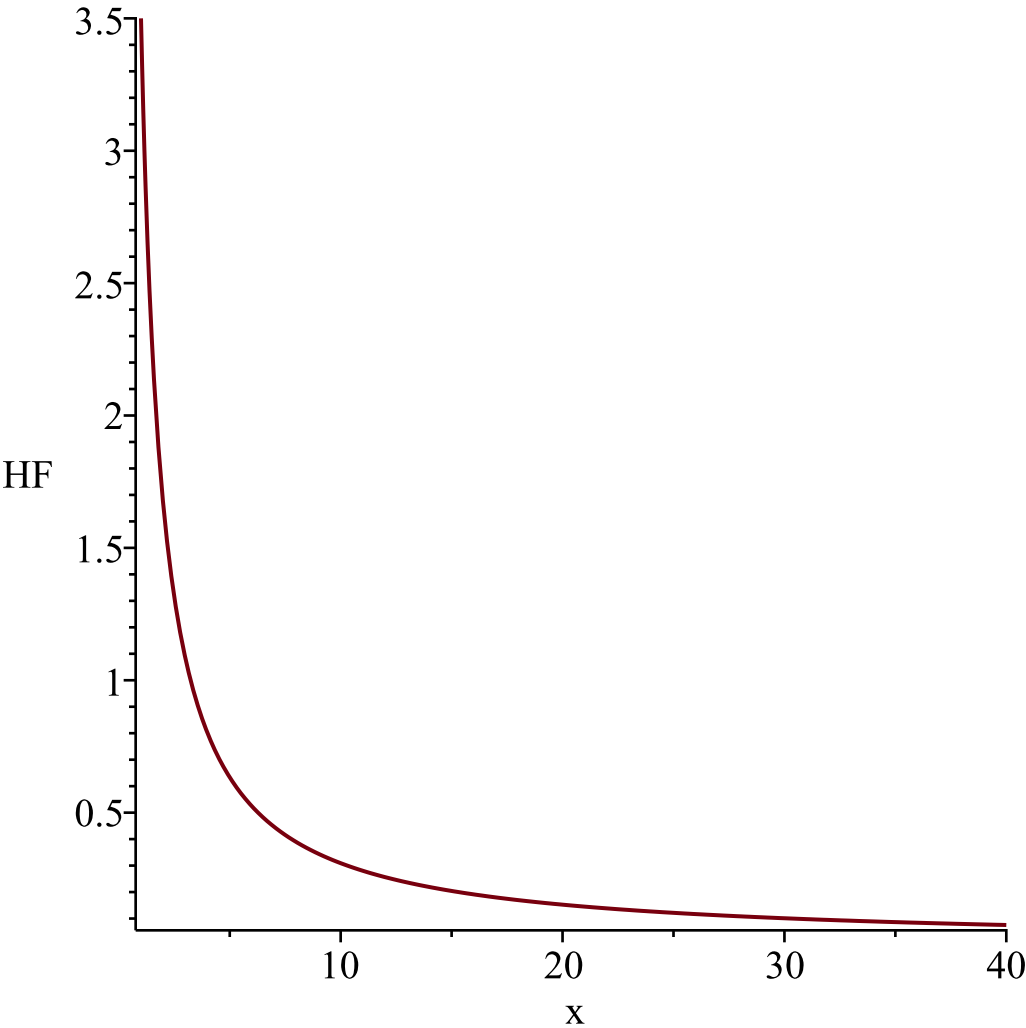
Resetting low to RV's minimum support value



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

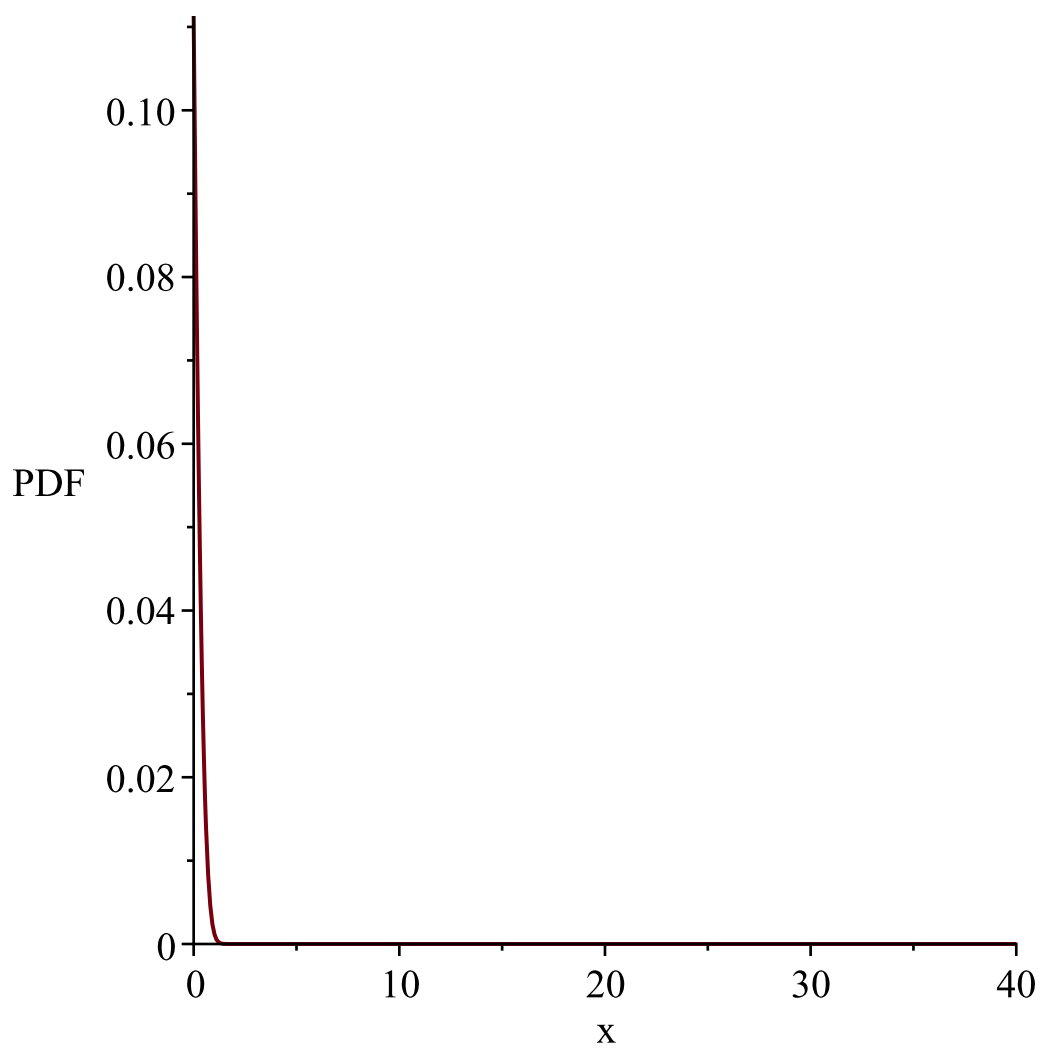
1

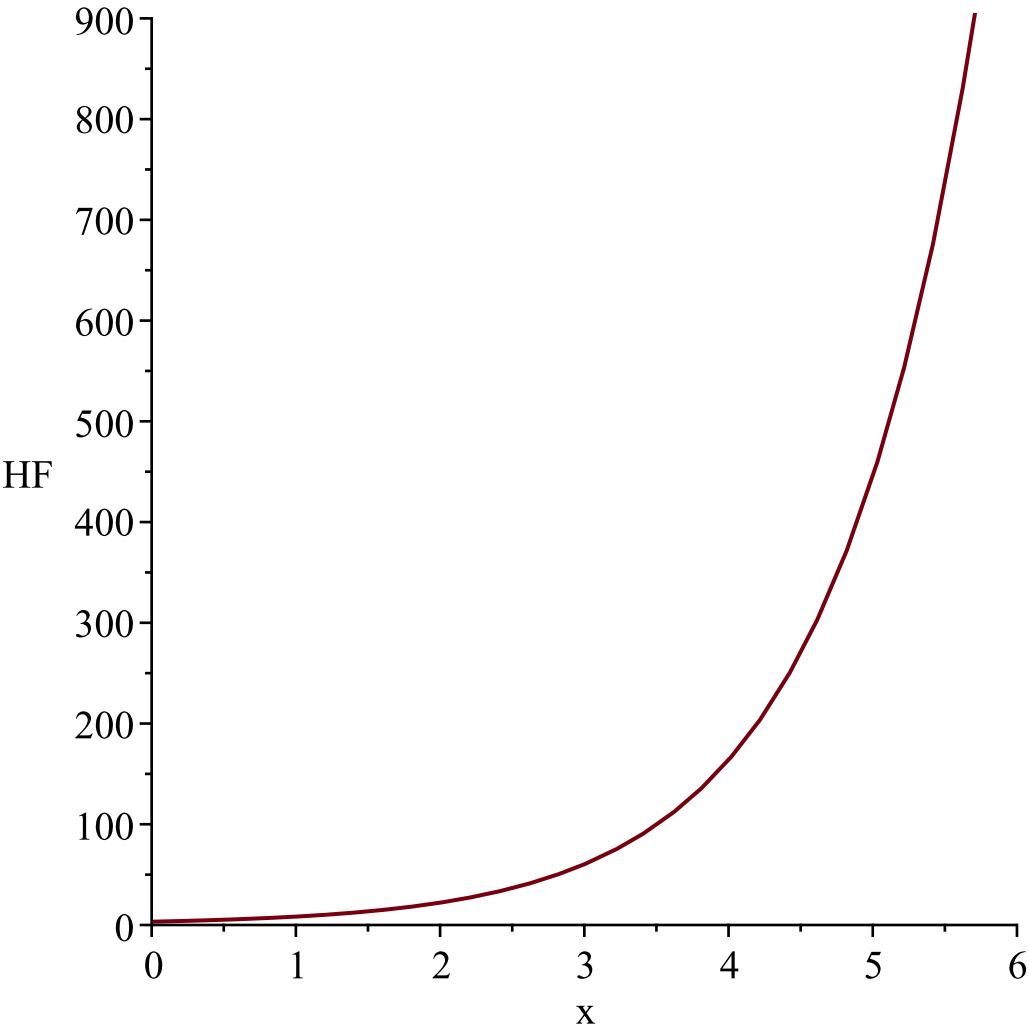
Resetting low to RV's minimum support value



"i is", 6,
" _____
-----"

$$\begin{aligned} g &:= t \rightarrow \ln(t) \\ l &:= 0 \\ u &:= \infty \\ Temp &:= \left[\left[y \rightsquigarrow \frac{1}{2} \, \mathrm{e}^{-3 \, \mathfrak{e}^{y \sim} + y \sim} \left(3 + 4 \, \mathrm{e}^{-\mathfrak{e}^{y \sim}} \right) \right], [-\infty, \infty], ["Continuous", "PDF"] \right] \end{aligned}$$





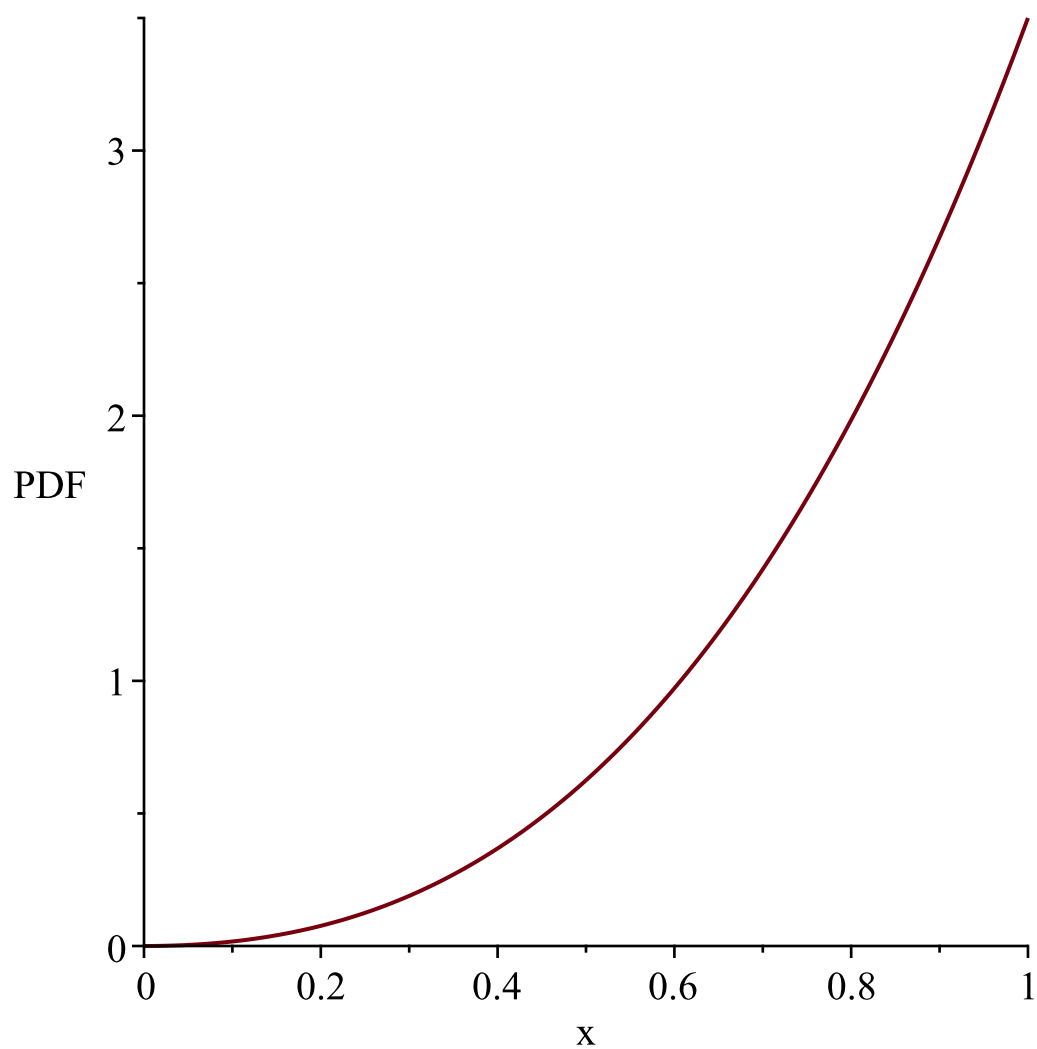
"i is", 7,
"-----"
-----"

$$g := t \rightarrow e^{-t}$$
$$l := 0$$
$$u := \infty$$

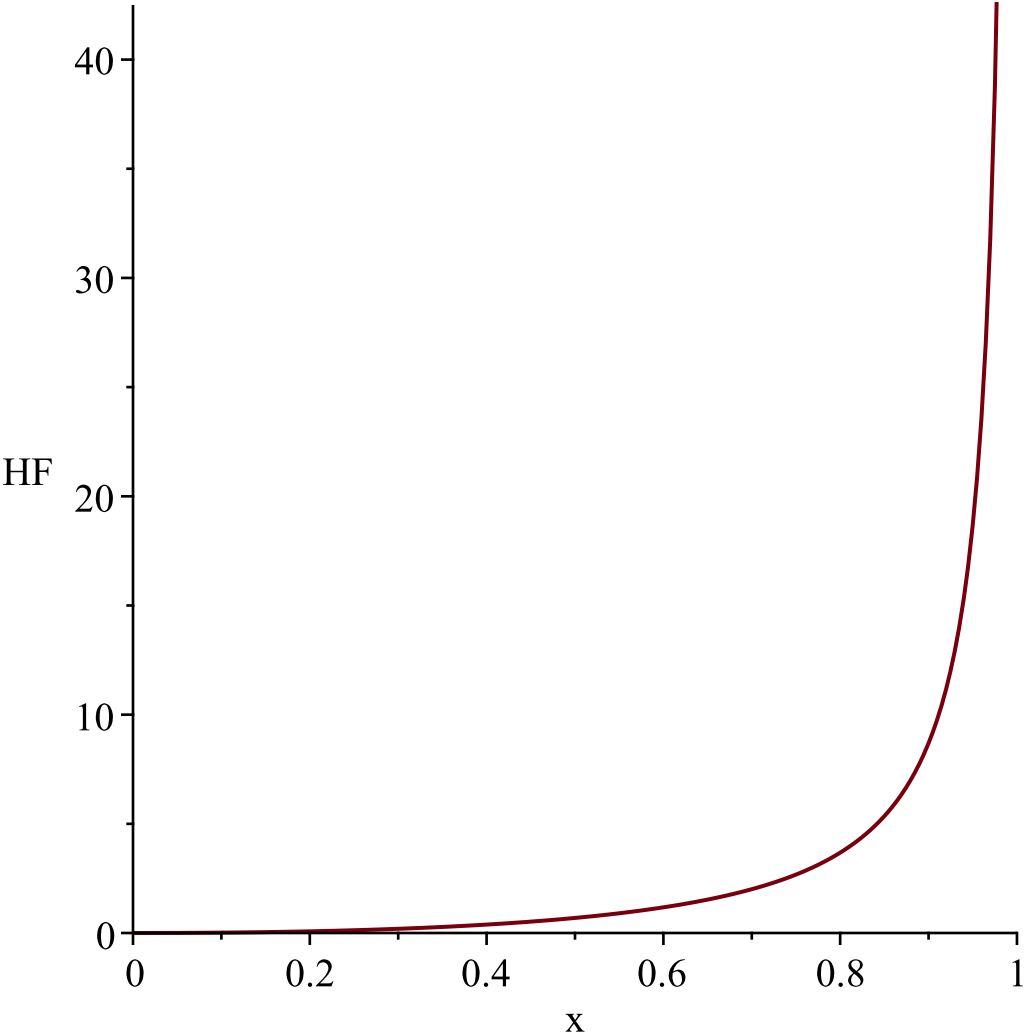
$$Temp := \left[\left[y \rightsquigarrow \frac{1}{2} y^2 (3 + 4 y \rightsquigarrow) \right], [0, 1], ["Continuous", "PDF"] \right]$$

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

Resetting high to RV's maximum support value

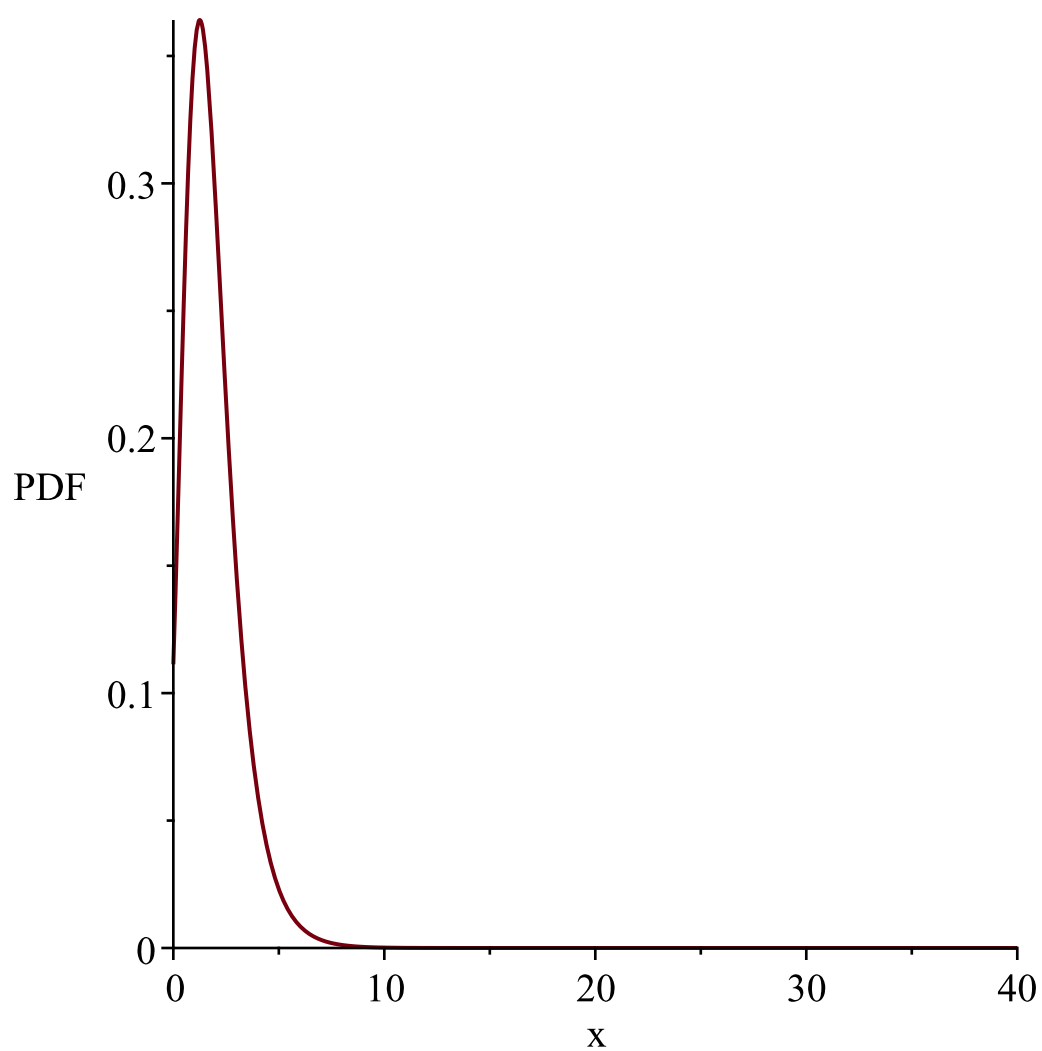


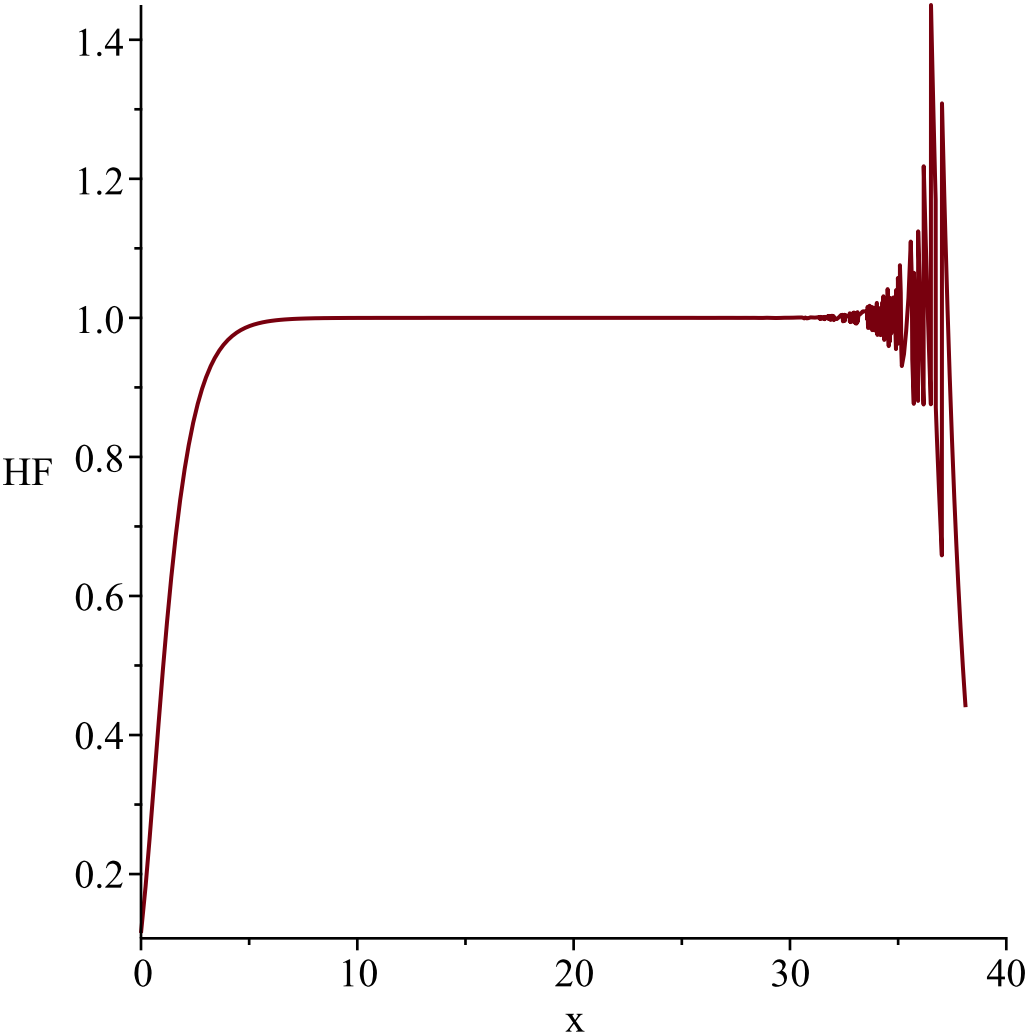
*WARNING(PlotDist): High value provided by user, 40
is greater than maximum support value of the random
variable, 1
Resetting high to RV's maximum support value*



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

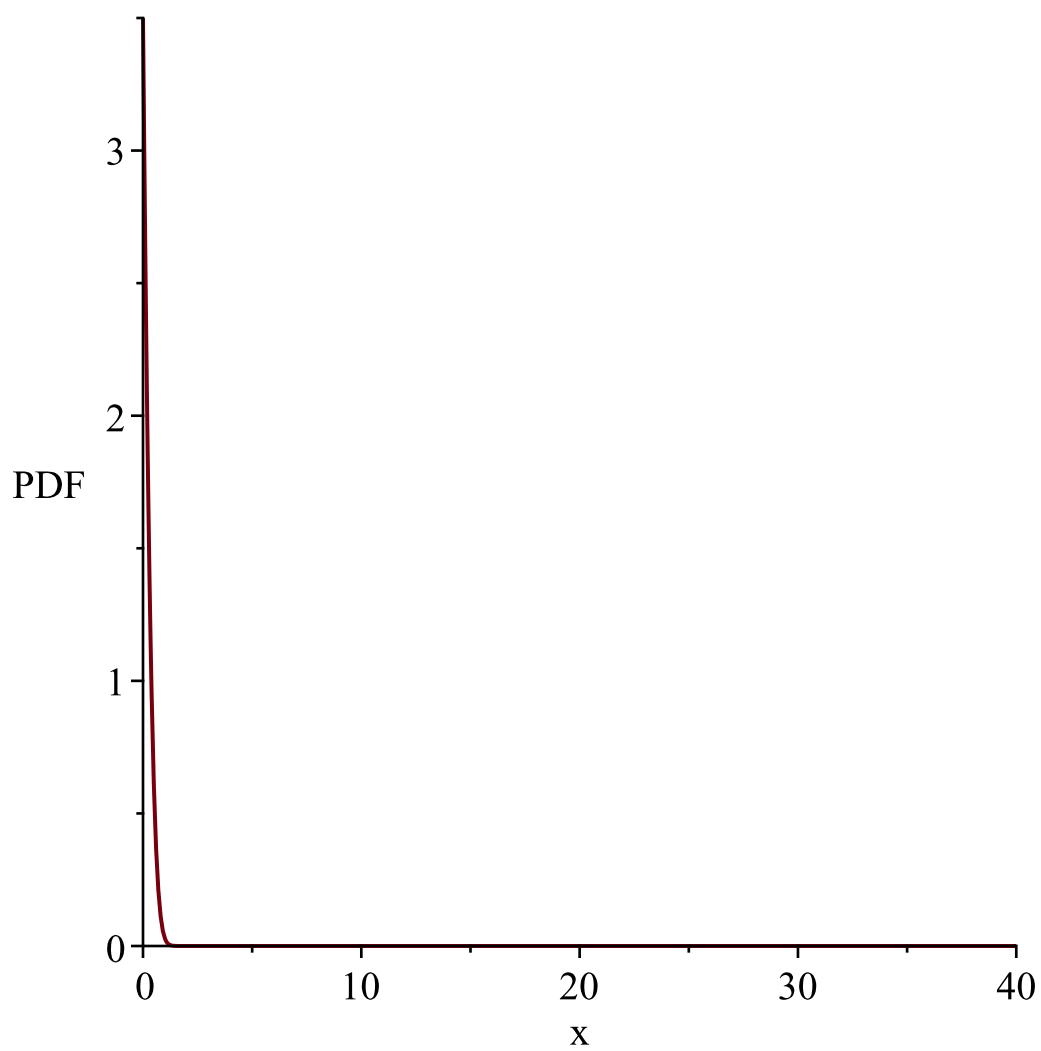
$$\begin{aligned} g &:= t \rightarrow -\ln(t) \\ l &:= 0 \\ u &:= \infty \\ Temp &:= \left[\left[y \rightsquigarrow \frac{1}{2} \, \mathrm{e}^{-3 \, \mathrm{e}^{-y \rightsquigarrow} - y \rightsquigarrow} \left(3 + 4 \, \mathrm{e}^{-\mathrm{e}^{-y \rightsquigarrow}} \right) \right], [-\infty, \infty], ["Continuous", "PDF"] \right] \end{aligned}$$

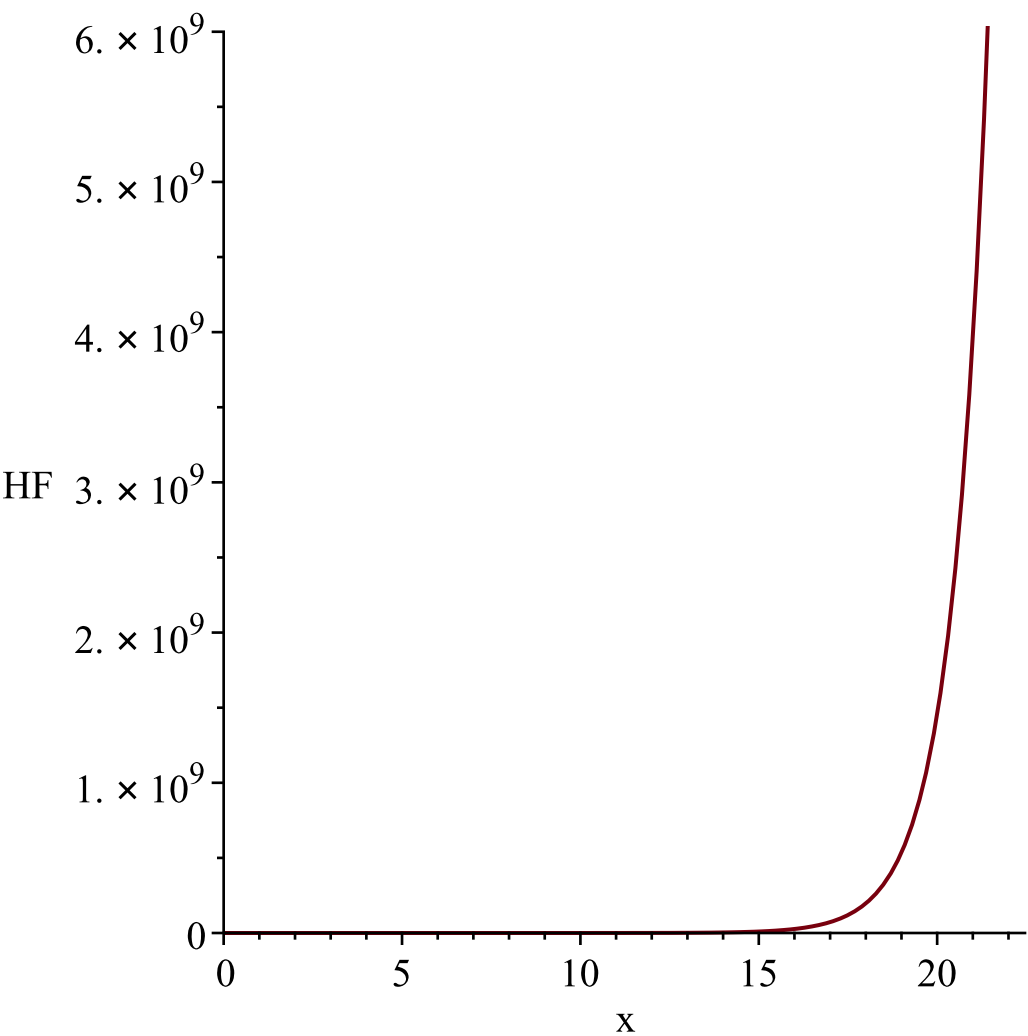




"i is", 9,
"-----"
-----"

$$\begin{aligned} g &:= t \rightarrow \ln(t+1) \\ l &:= 0 \\ u &:= \infty \\ Temp &:= \left[\left[y \rightsquigarrow \frac{1}{2} \left(3 \, \mathrm{e}^{-3 \, \mathfrak{e}^{y \rightsquigarrow} + 3} + 4 \, \mathrm{e}^{-4 \, \mathfrak{e}^{y \rightsquigarrow} + 4} \right) \, \mathfrak{e}^{y \rightsquigarrow} \right], [0, \infty], ["Continuous", "PDF"] \right] \end{aligned}$$



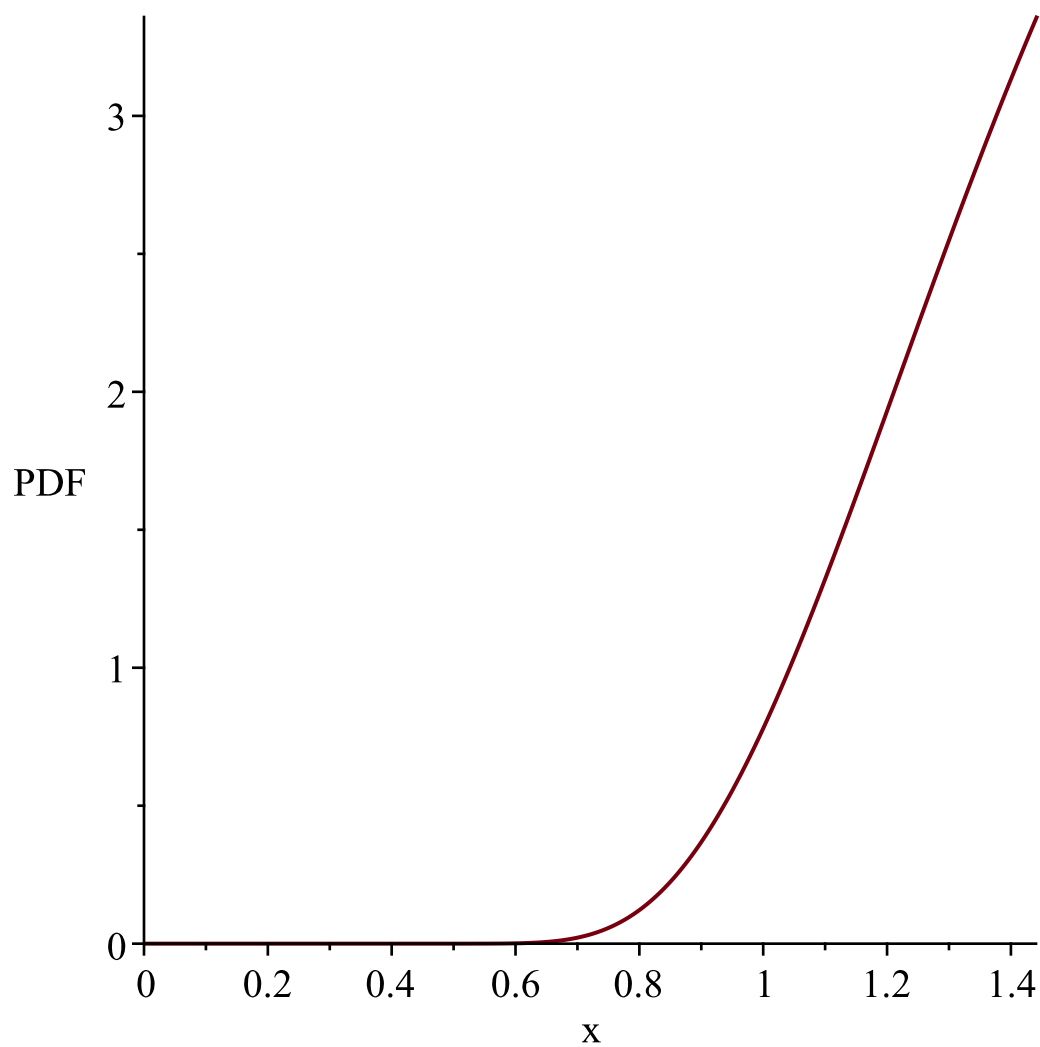


"i is", 10,
"-----"
"-----"

$$g := t \rightarrow \frac{1}{\ln(t+2)}$$
$$l := 0$$
$$u := \infty$$
$$Temp := \left[\left[y \sim \rightarrow \frac{1}{2} \frac{\left(3 e^{-3 e^{\frac{1}{y}}} + 6 + 4 e^{-4 e^{\frac{1}{y}}} + 8 \right) e^{\frac{1}{y}}}{y^2} \right], \left[0, \frac{1}{\ln(2)} \right], ["Continuous",$$
$$"PDF"] \right]$$

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

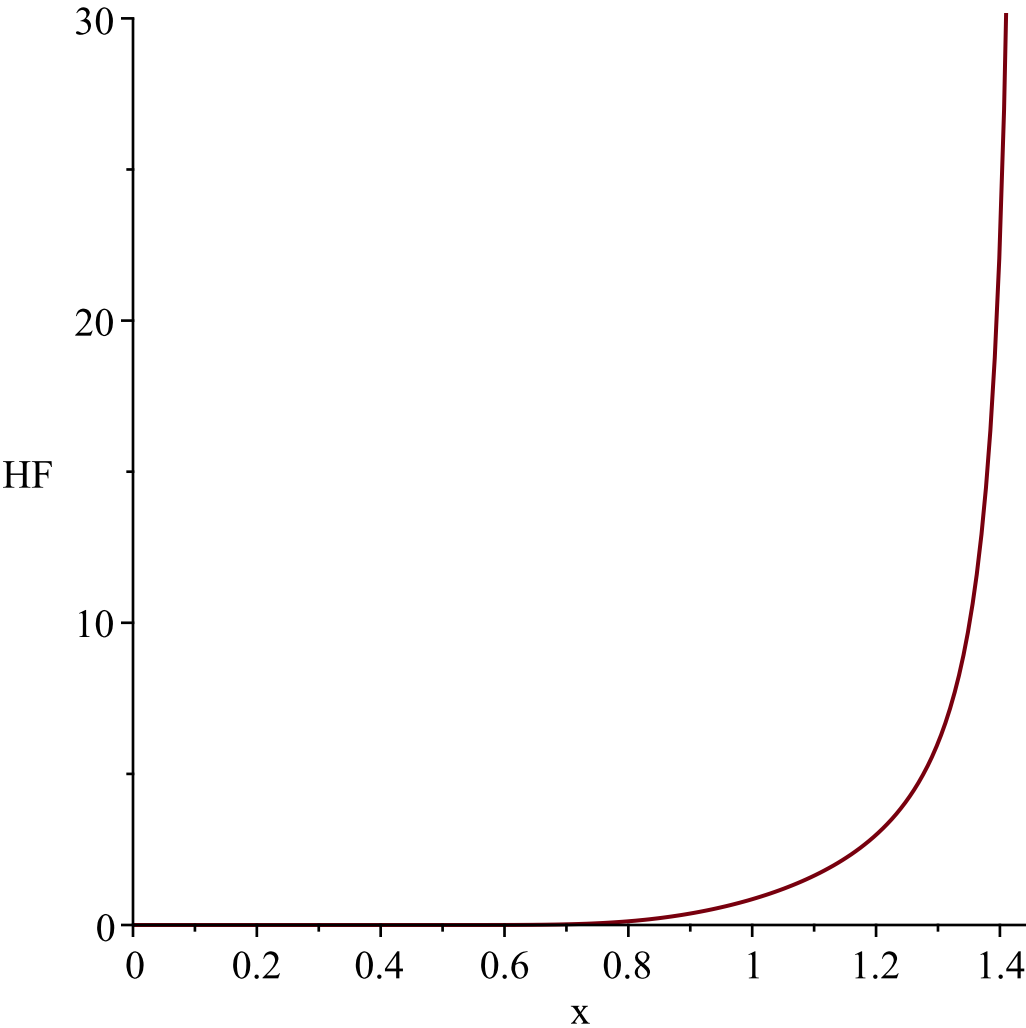
Resetting high to RV's maximum support value



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

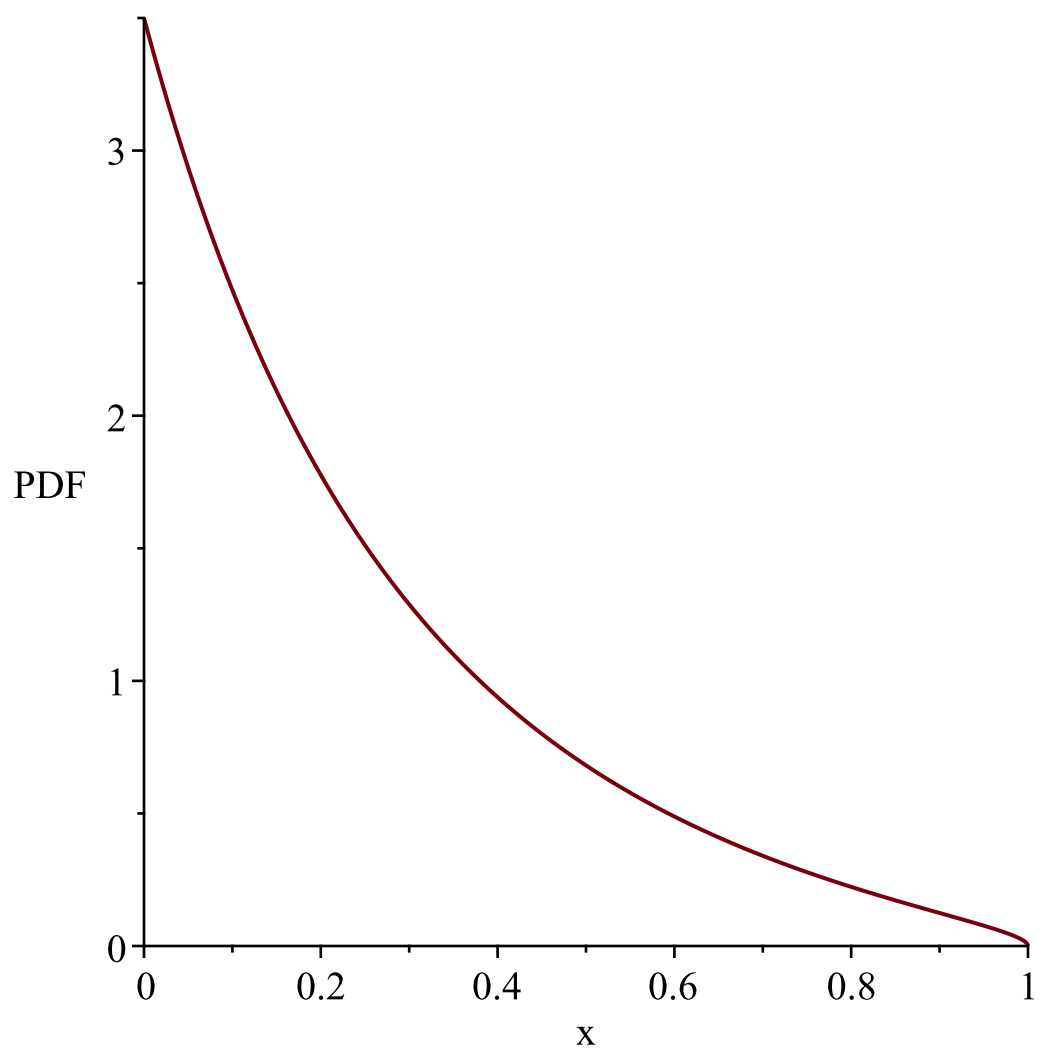
variable, $\frac{1}{\ln(2)}$

Resetting high to RV's maximum support value

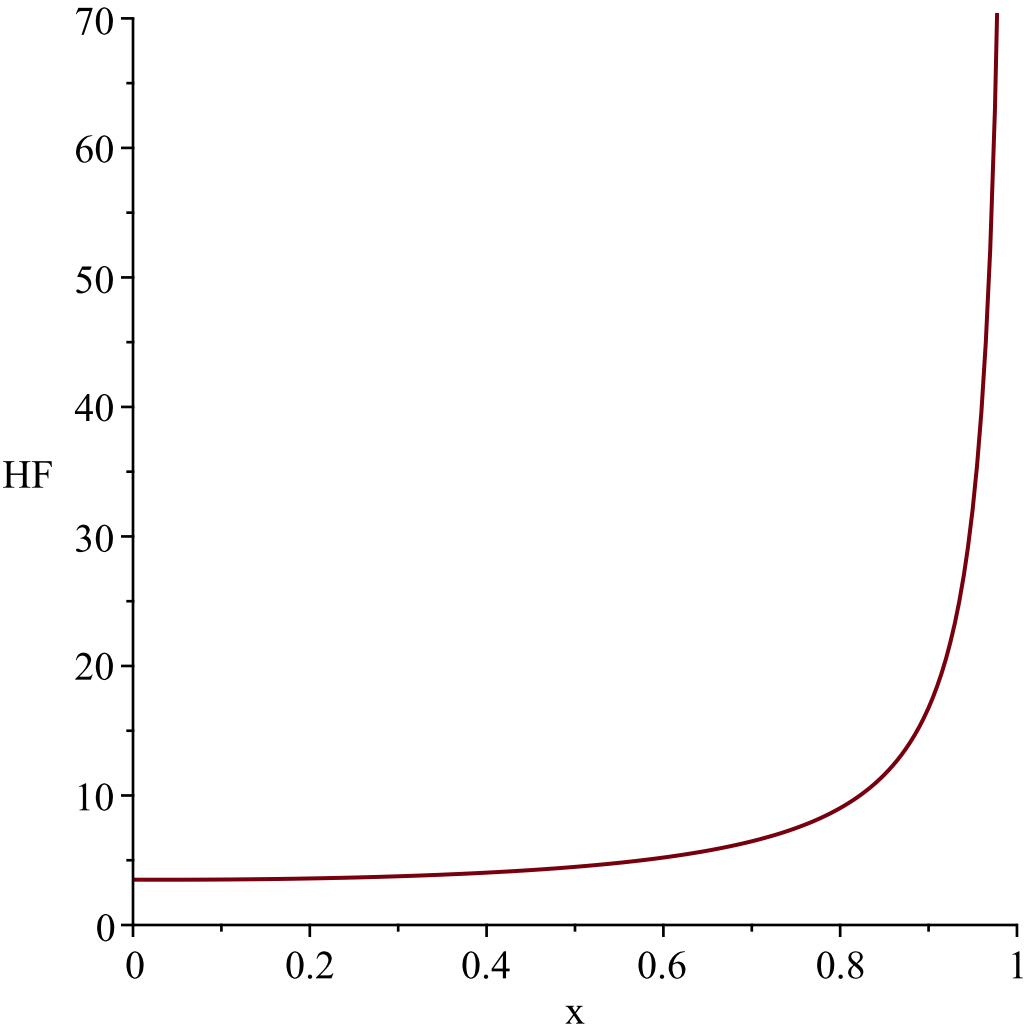


"i is", 11,
"-----"
-----"

```
g := t→tanh(t)
l := 0
u := ∞
Temp := ⌊⌊y~→ 1/2 * (-4*y~ + 3*sqrt(-y~^2 + 1) + 4) / (y~ + 1)^3 ⌋, [0, 1], ["Continuous", "PDF"] ⌋
WARNING(PlotDist): High value provided by user, 40
is greater than maximum support value of the random
variable, 1
Resetting high to RV's maximum support value
```

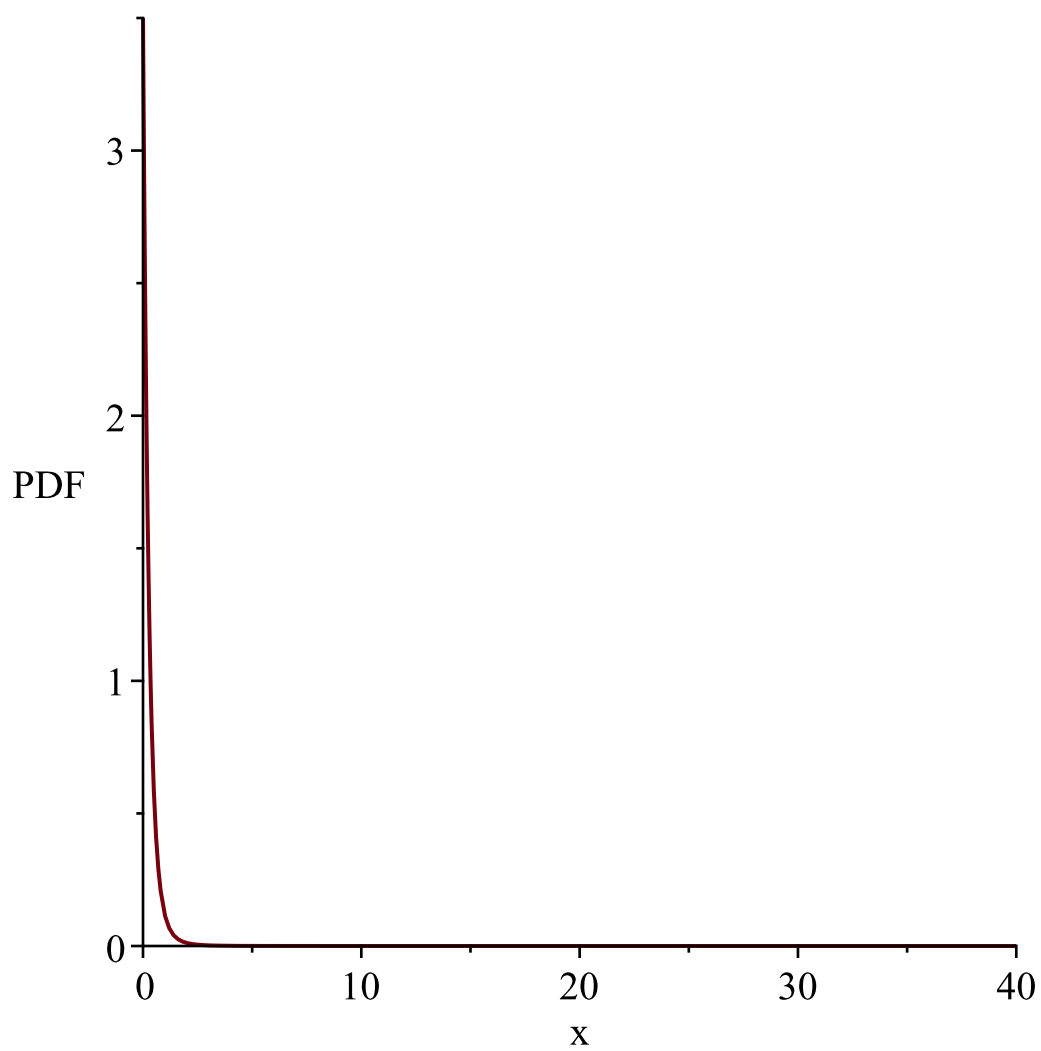


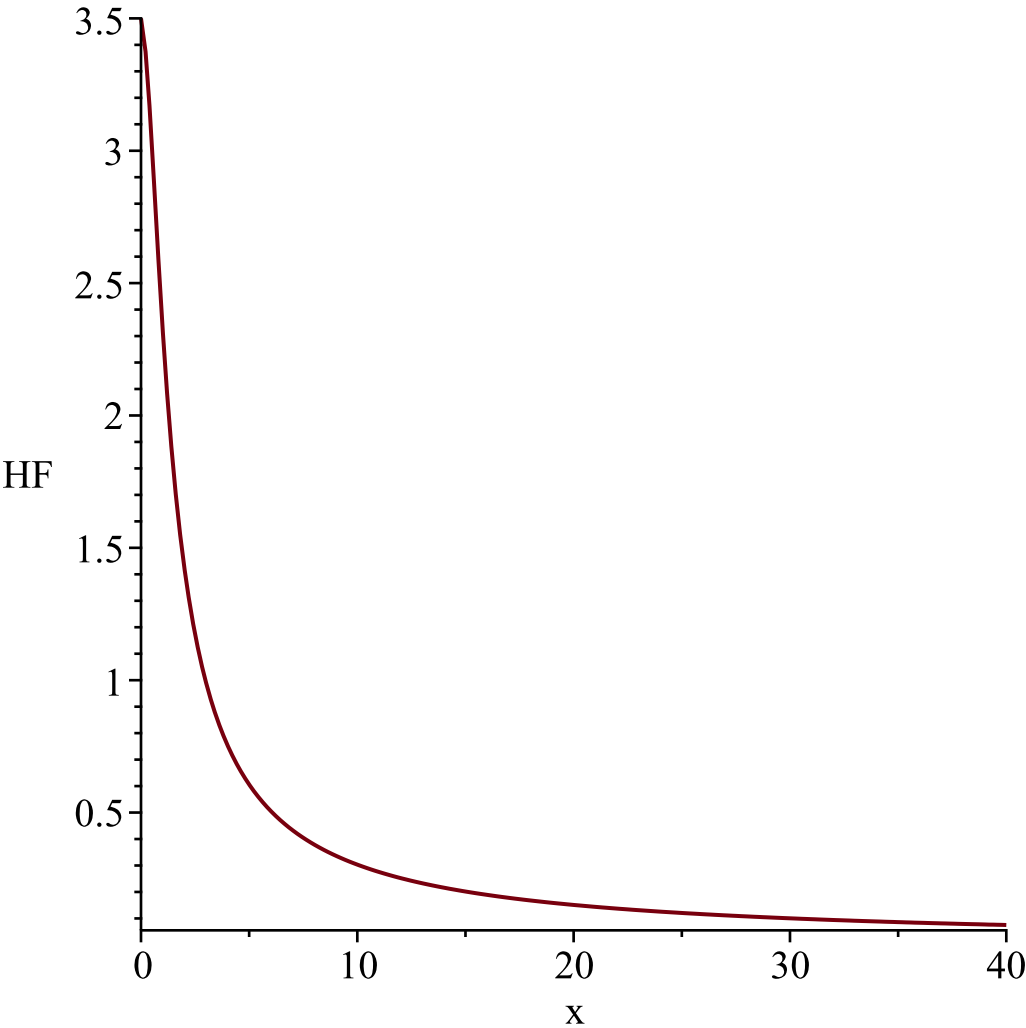
*WARNING(PlotDist): High value provided by user, 40
is greater than maximum support value of the random
variable, 1
Resetting high to RV's maximum support value*



"i is", 12,
" _____"
"_____"

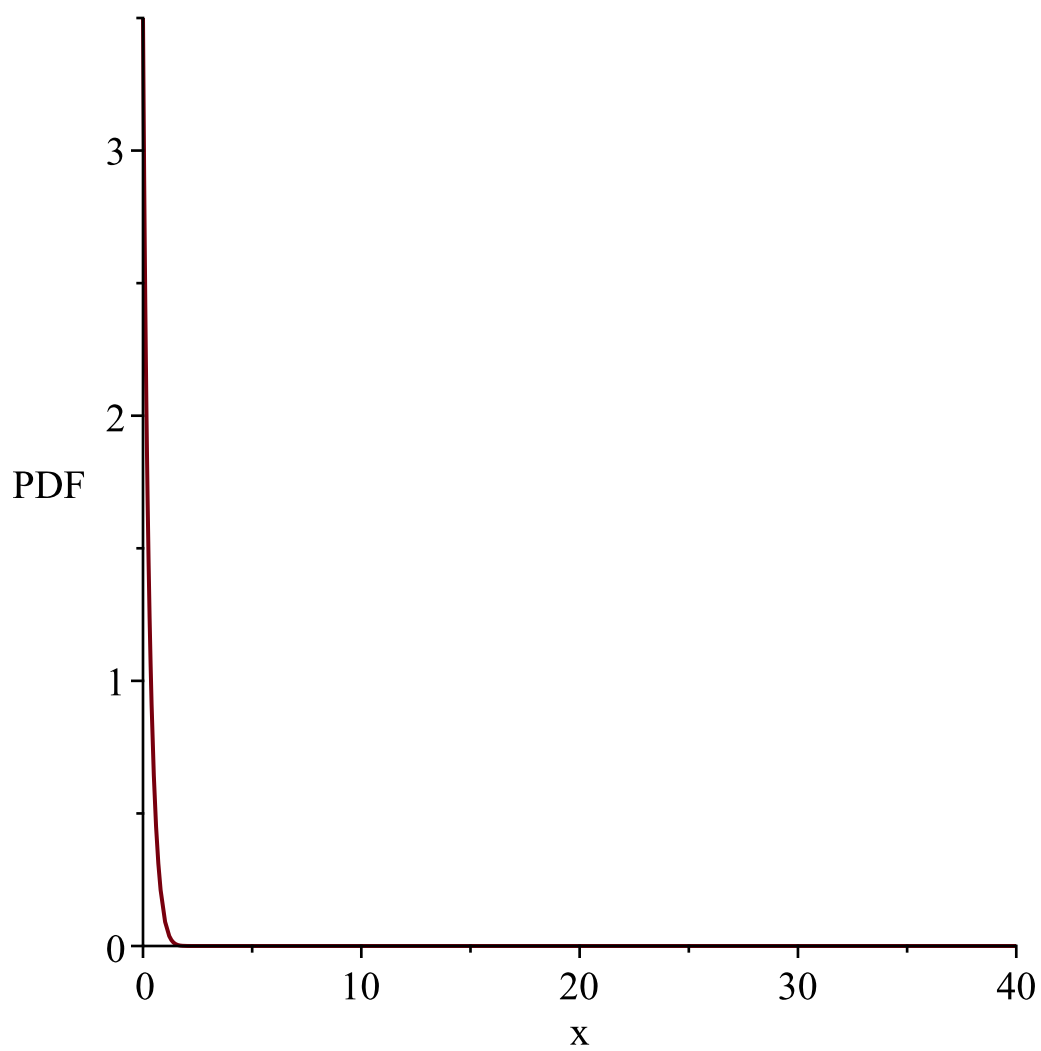
$$\begin{aligned} g &:= t \rightarrow \sinh(t) \\ l &:= 0 \\ u &:= \infty \\ Temp &:= \left[\left[y \rightarrow \frac{1}{2} \frac{3 y + 3 \sqrt{y^2 + 1} + 4}{\left(y + \sqrt{y^2 + 1} \right)^4 \sqrt{y^2 + 1}} \right], [0, \infty], ["Continuous", "PDF"] \right] \end{aligned}$$

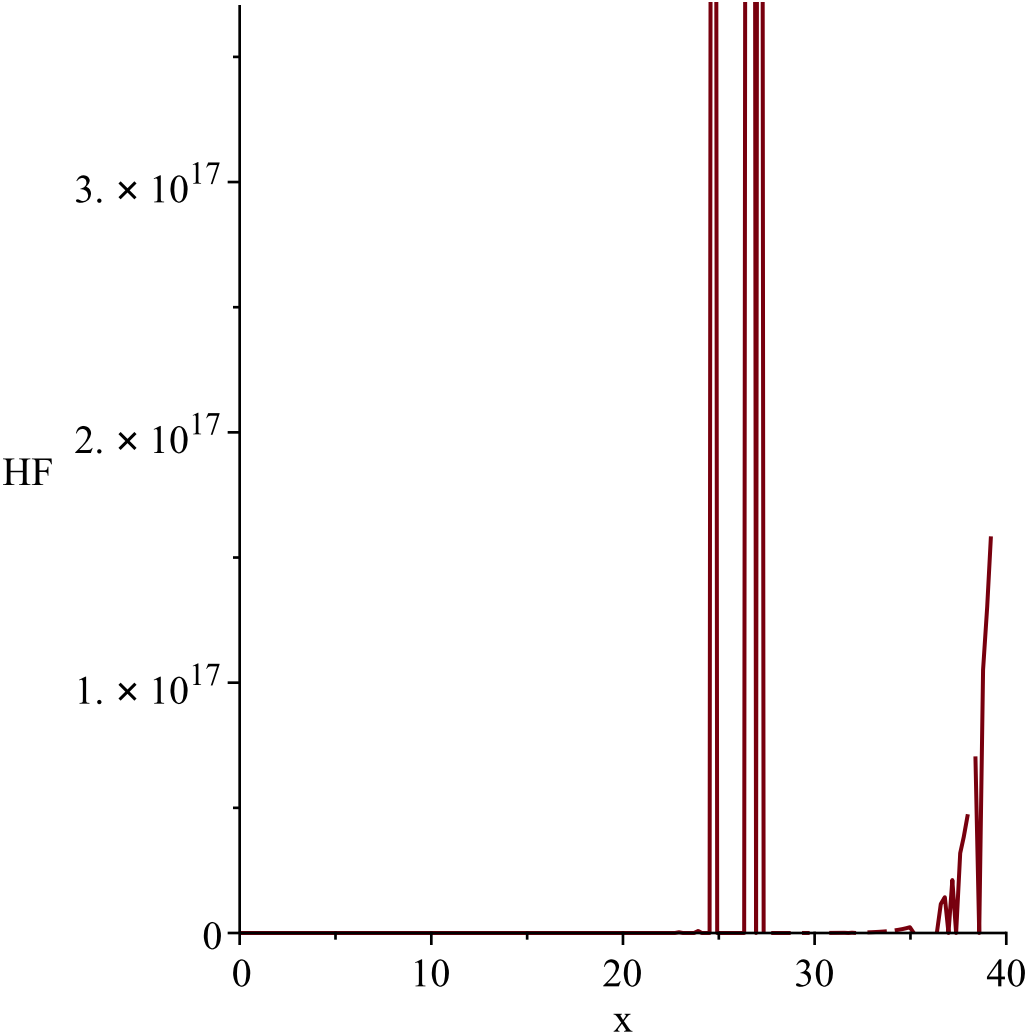




"i is", 13,
"-----"
-----"

$$\begin{aligned} g &:= t \rightarrow \operatorname{arcsinh}(t) \\ l &:= 0 \\ u &:= \infty \\ Temp &:= \left[\left[y \rightsquigarrow \frac{1}{2} \, \mathrm{e}^{-3 \sinh(y \rightsquigarrow)} \left(4 \, \mathrm{e}^{-\sinh(y \rightsquigarrow)} + 3 \right) \cosh(y \rightsquigarrow) \right], [0, \infty], ["Continuous", "PDF"] \right] \end{aligned}$$





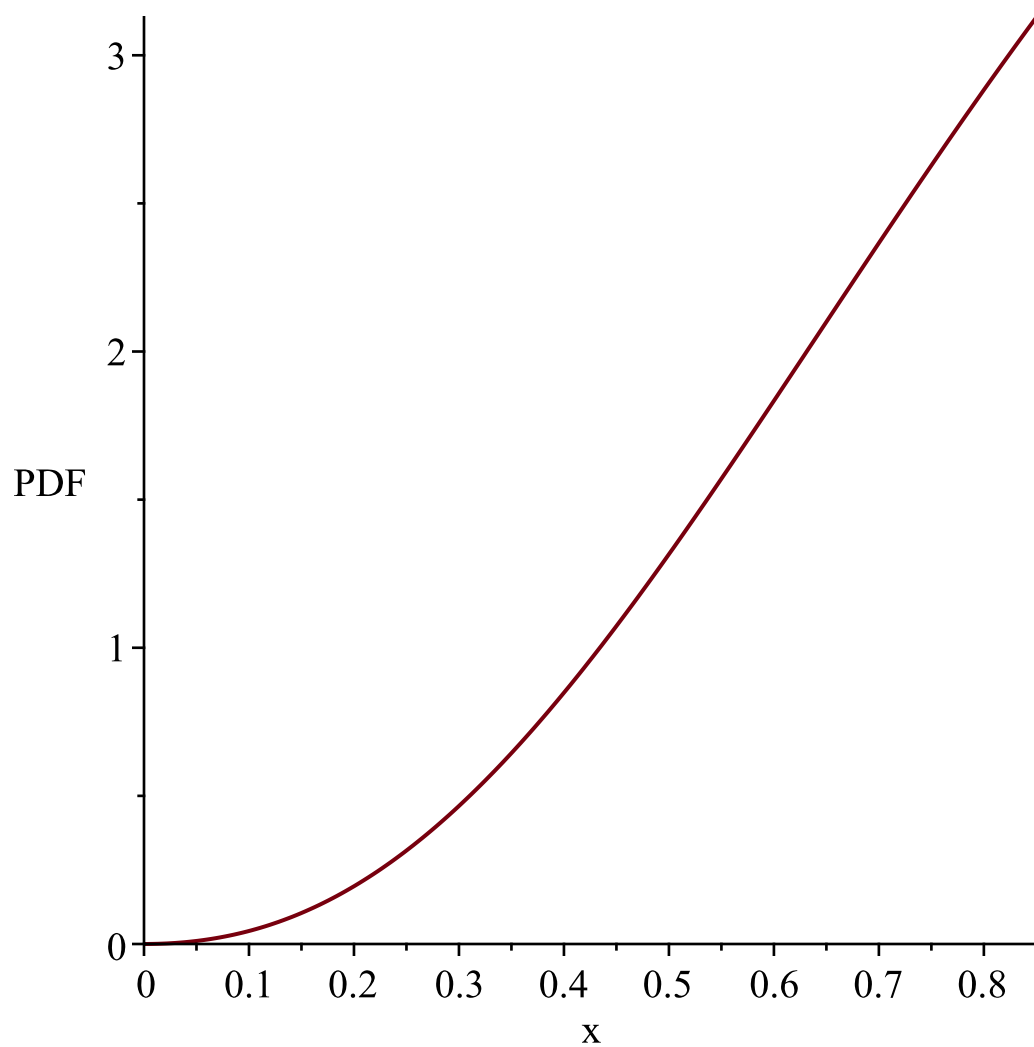
"i is", 14,
"-----"
"-----"

$$g := t \rightarrow \operatorname{csch}(t + 1)$$
$$l := 0$$
$$u := \infty$$
$$Temp := \left[\left[y \sim \rightarrow \frac{1}{2} \frac{3 e^3 - 3 \operatorname{arcsch}(y \sim) + 4 e^4 - 4 \operatorname{arcsch}(y \sim)}{\sqrt{y \sim^2 + 1} |y \sim|} \right], \left[0, \frac{2}{e - e^{-1}} \right], ["Continuous",$$
$$"PDF"] \right]$$

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

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

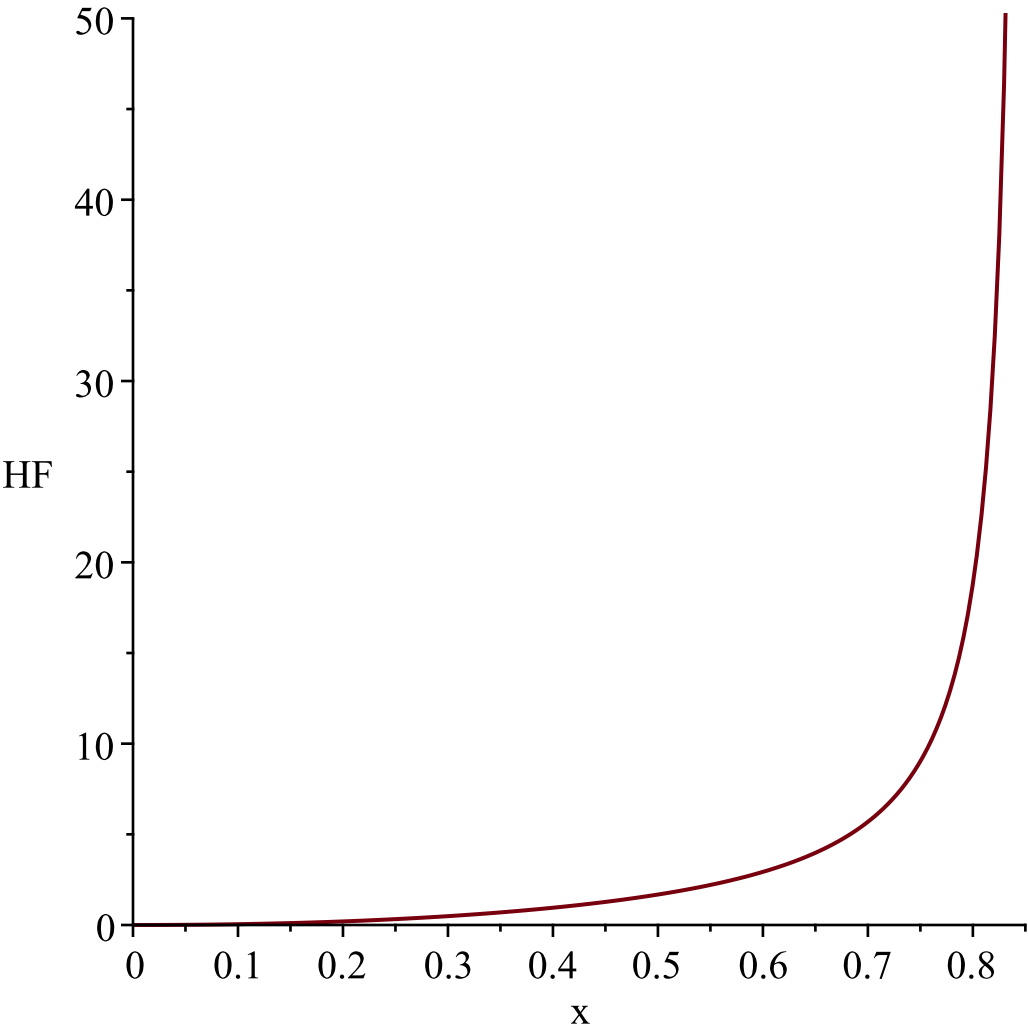
Resetting high to RV's maximum support value



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

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

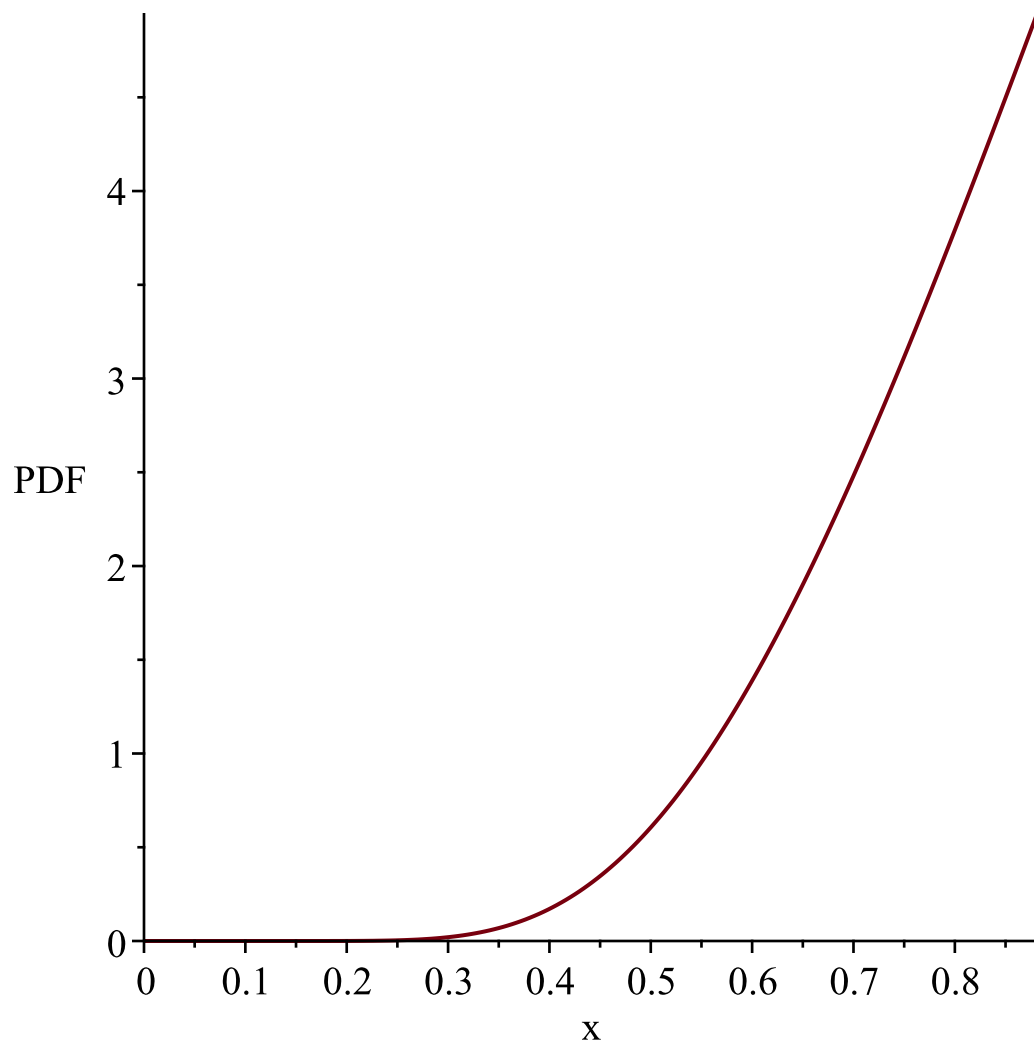
Resetting high to RV's maximum support value



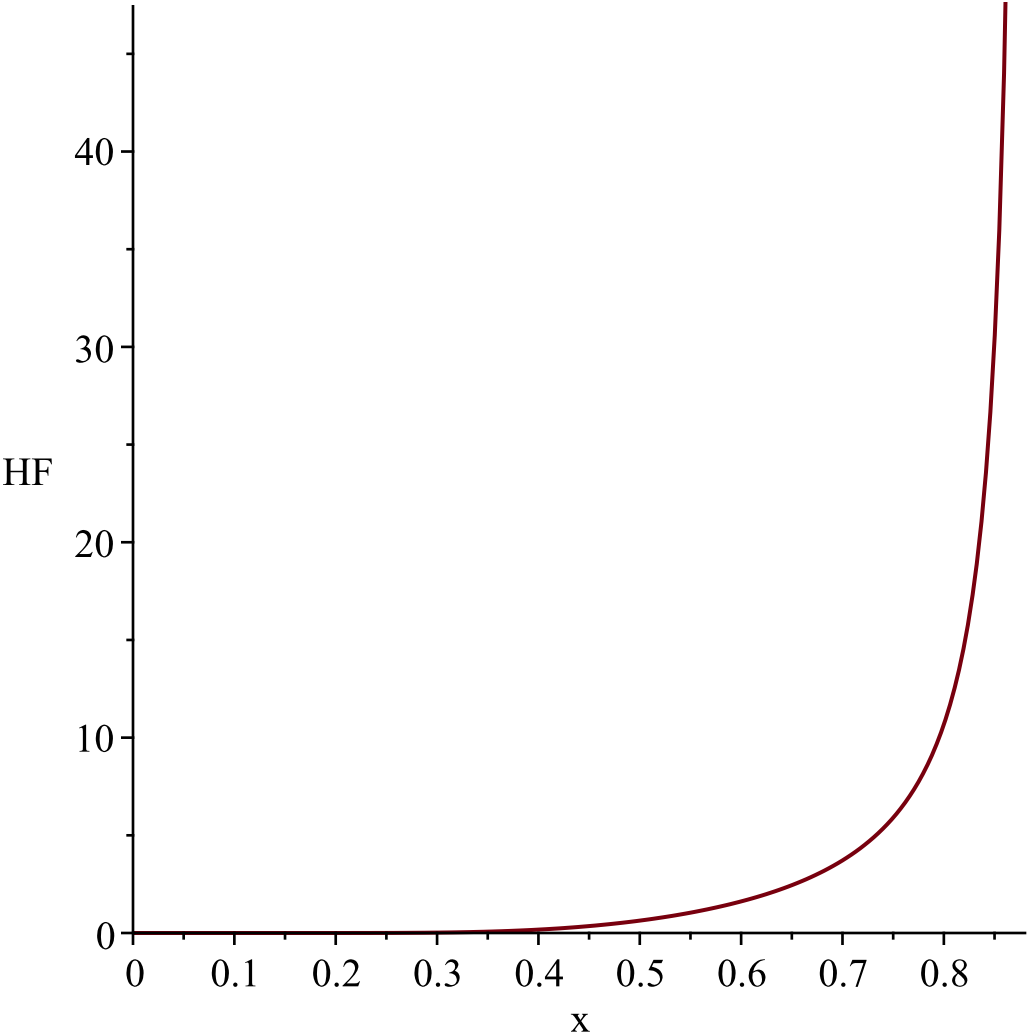
"i is", 15,
"-----"
-----"

$$g := t \rightarrow \operatorname{arccsch}(t + 1)$$
$$l := 0$$
$$u := \infty$$
$$Temp := \left[\left[y \sim \rightarrow \frac{1}{2} \frac{e^{\frac{3 (\sinh(y \sim) - 1)}{\sinh(y \sim)}} \left(4 e^{\frac{\sinh(y \sim) - 1}{\sinh(y \sim)}} + 3 \right) \cosh(y \sim)}{\sinh(y \sim)^2} \right], [0, \ln(1 + \sqrt{2})], \right. \\ \left. ["Continuous", "PDF"] \right]$$

*WARNING(PlotDist): High value provided by user, 40
is greater than maximum support value of the random
variable, $\ln(1 + \sqrt{2})$
Resetting high to RV's maximum support value*



*WARNING(PlotDist): High value provided by user, 40
is greater than maximum support value of the random
variable, $\ln(1 + \sqrt{2})$
Resetting high to RV's maximum support value*



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

$$g := t \rightarrow \frac{1}{\tanh(t + 1)}$$
$$l := 0$$
$$u := \infty$$

$$Temp := \left[\left[y \sim \rightarrow \frac{1}{2} \frac{3 e^{3 - 3 \operatorname{arctanh}\left(\frac{1}{y \sim}\right)} + 4 e^{4 - 4 \operatorname{arctanh}\left(\frac{1}{y \sim}\right)}}{y \sim^2 - 1} \right], \left[1, \frac{e + e^{-1}}{e - e^{-1}} \right], ["Continuous",$$

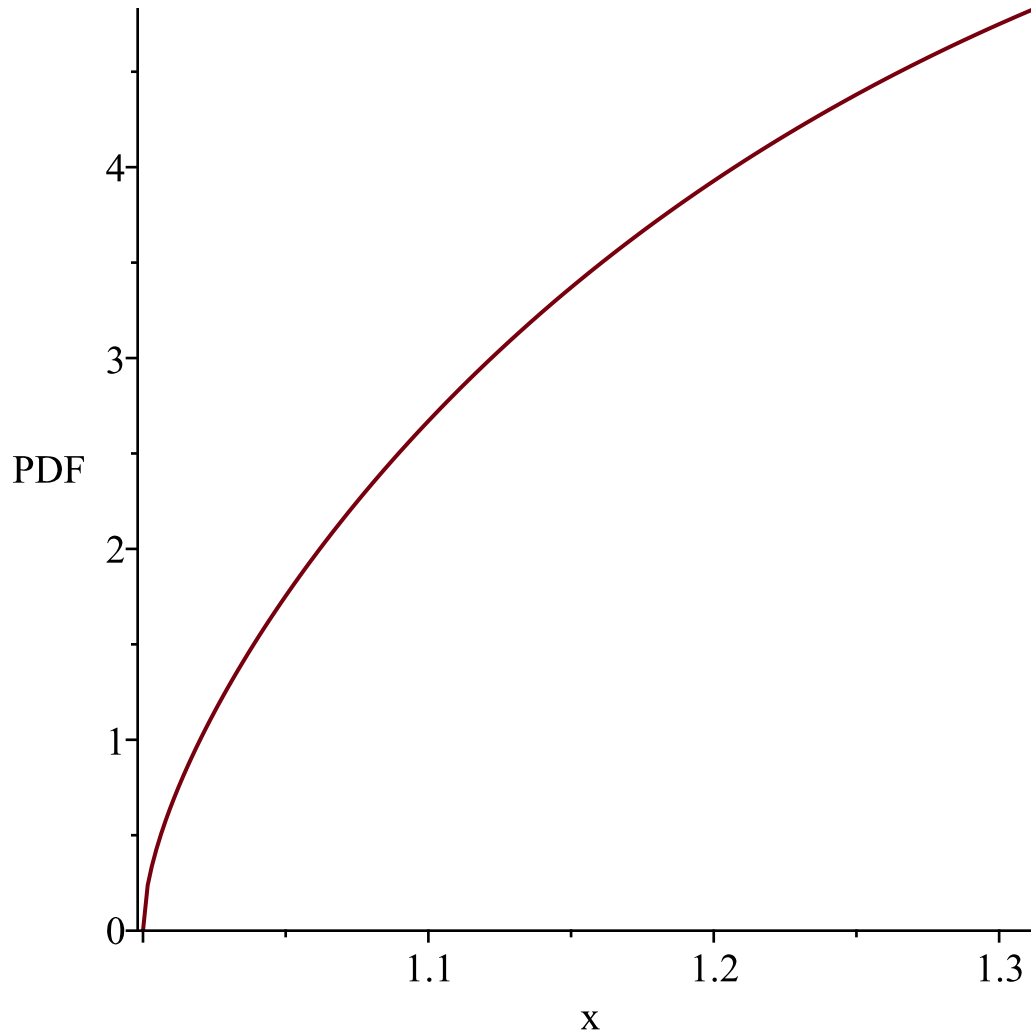
"PDF"]

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

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

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

Resetting high to RV's maximum support value



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

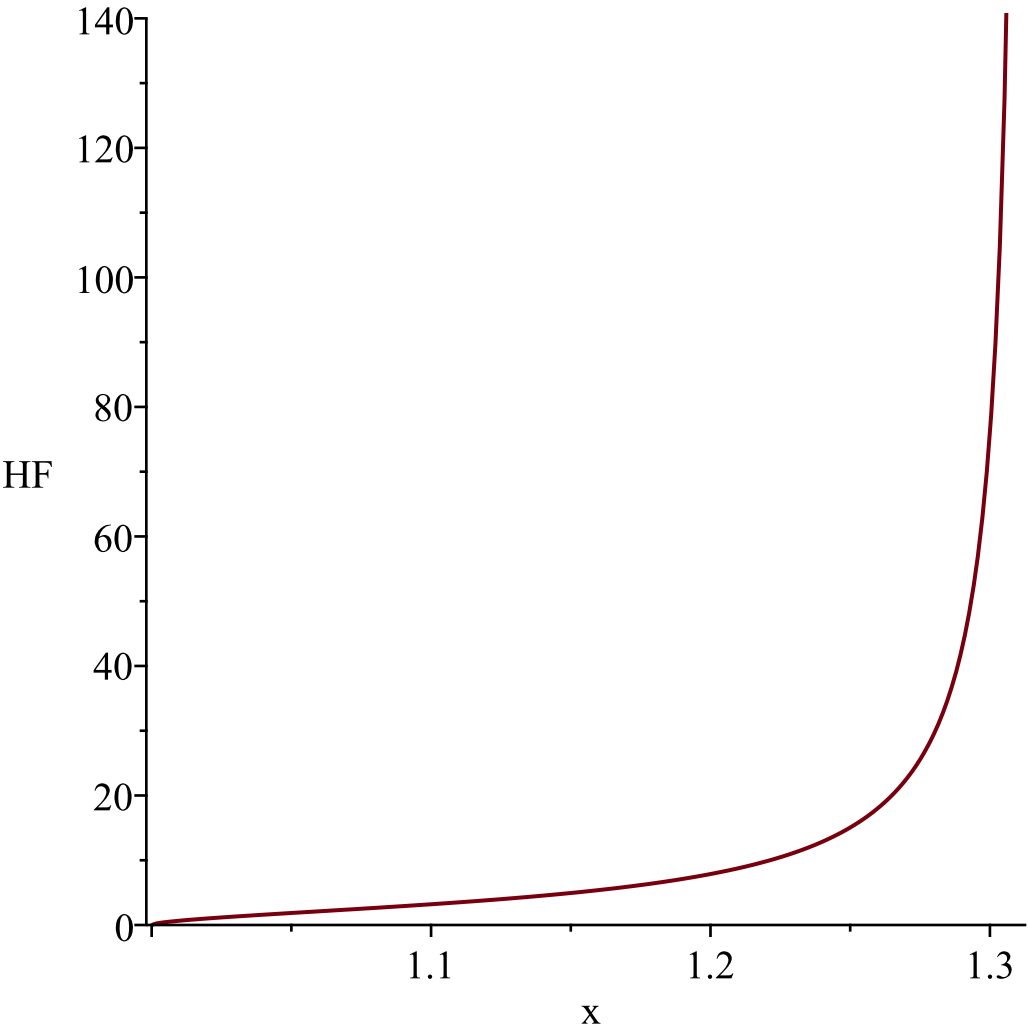
1

Resetting low to RV's minimum support value

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

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

Resetting high to RV's maximum support value

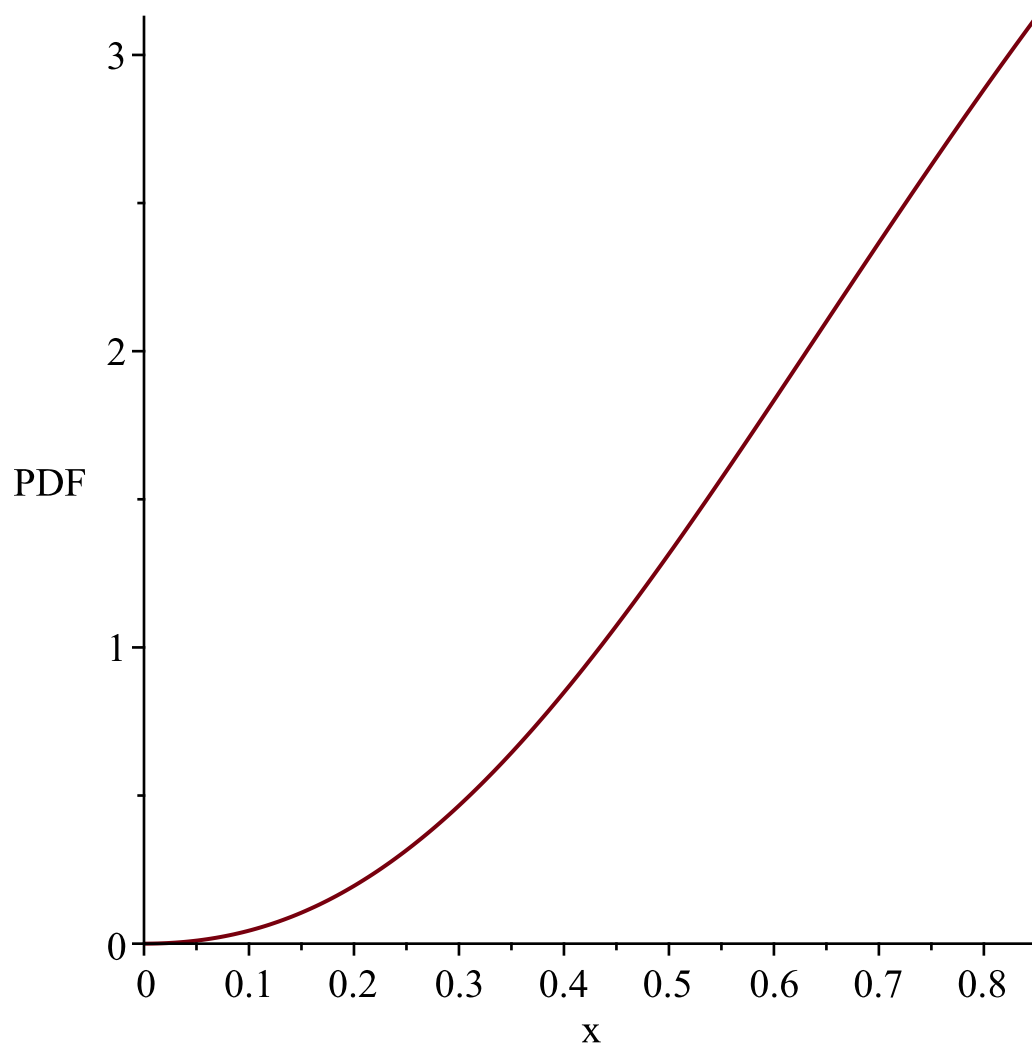


"i is", 17,
"-----"
"-----"

$$g := t \rightarrow \frac{1}{\sinh(t + 1)}$$
$$l := 0$$
$$u := \infty$$
$$Temp := \left[\left[y \sim \rightarrow \frac{1}{2} \frac{3 e^{3 - 3 \operatorname{arcsinh}\left(\frac{1}{y \sim}\right)} + 4 e^{4 - 4 \operatorname{arcsinh}\left(\frac{1}{y \sim}\right)}}{\sqrt{y \sim^2 + 1} |y \sim|} \right], \left[0, \frac{2}{e - e^{-1}} \right], ["Continuous", "PDF"] \right]$$

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

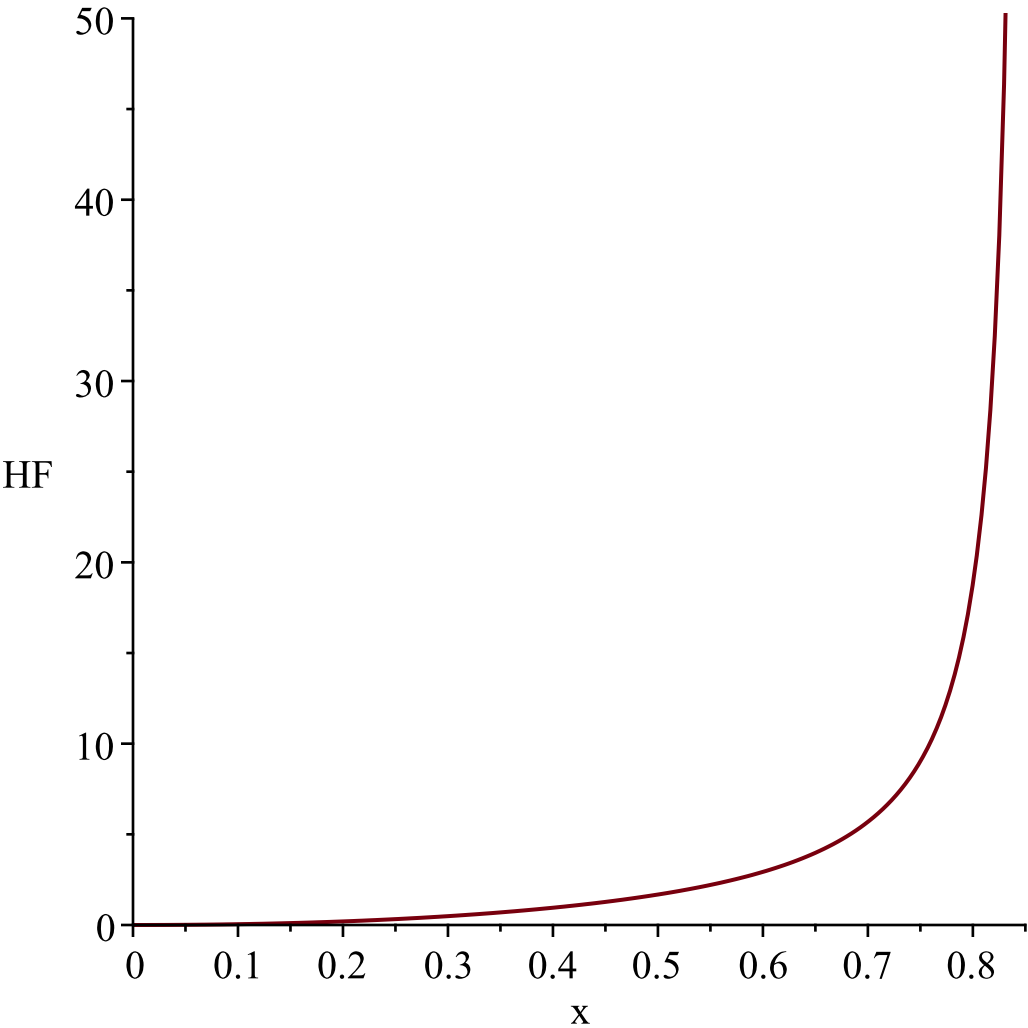
Resetting high to RV's maximum support value



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

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

Resetting high to RV's maximum support value



"i is", 18,
"-----"
"-----"

$$g := t \rightarrow \frac{1}{\operatorname{arcsinh}(t + 1)}$$
$$l := 0$$
$$u := \infty$$

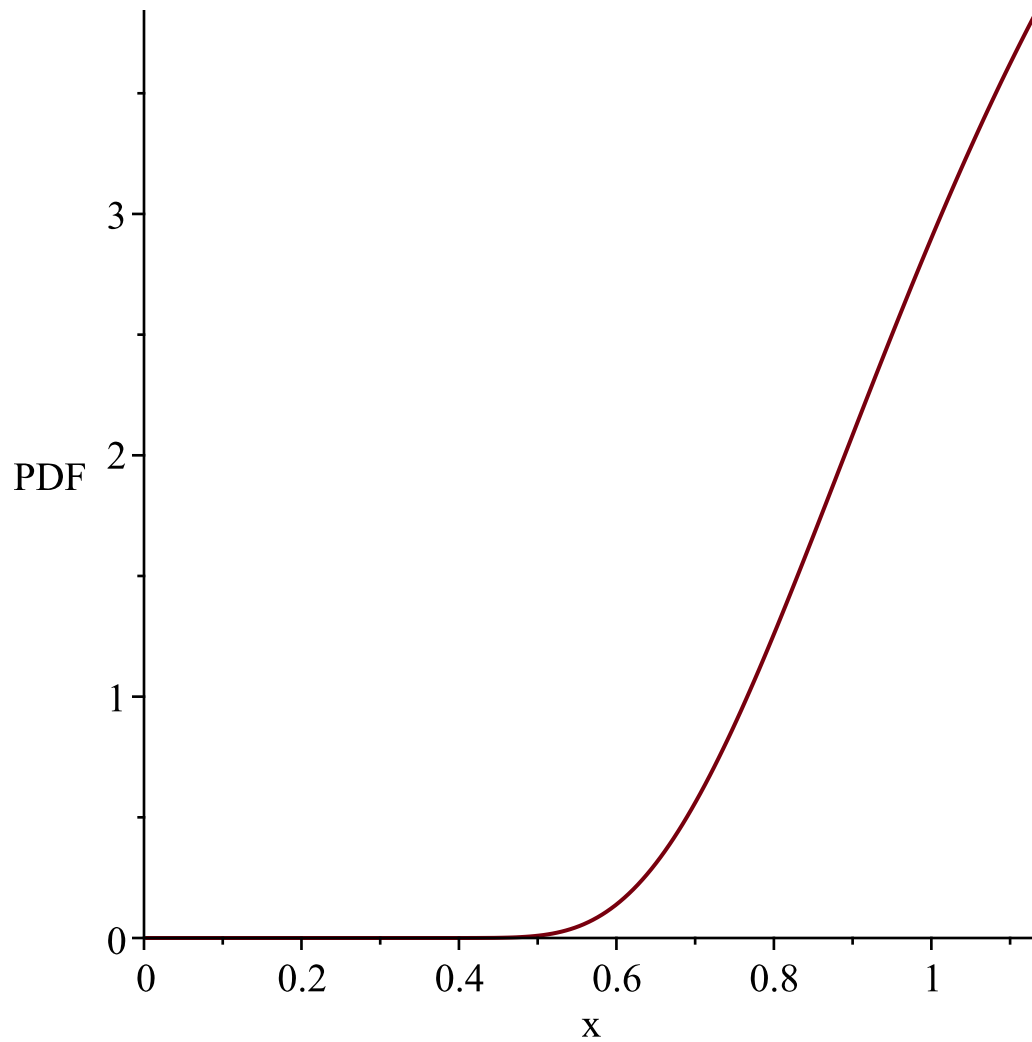
$$Temp := \left[\left[y_{\sim} \rightarrow \frac{1}{2} \frac{\left(3 e^{3 - 3 \sinh\left(\frac{1}{y_{\sim}}\right)} + 4 e^{4 - 4 \sinh\left(\frac{1}{y_{\sim}}\right)} \right) \cosh\left(\frac{1}{y_{\sim}}\right)}{y_{\sim}^2} \right], \left[0, \frac{1}{\ln(1 + \sqrt{2})} \right] \right]$$

$$["Continuous", "PDF"]$$

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

variable, $\frac{1}{\ln(1 + \sqrt{2})}$

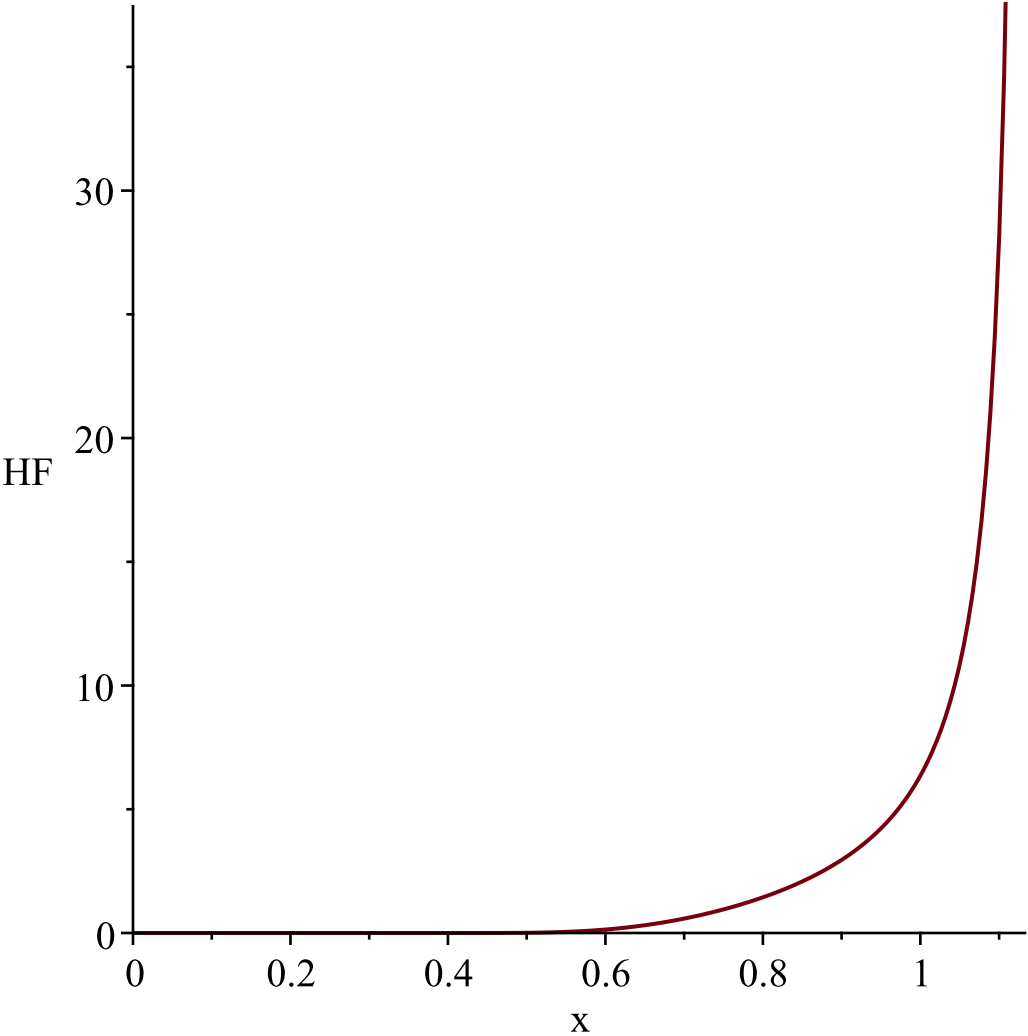
Resetting high to RV's maximum support value



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

variable, $\frac{1}{\ln(1 + \sqrt{2})}$

Resetting high to RV's maximum support value



"i is", 19,
"-----"
"-----"

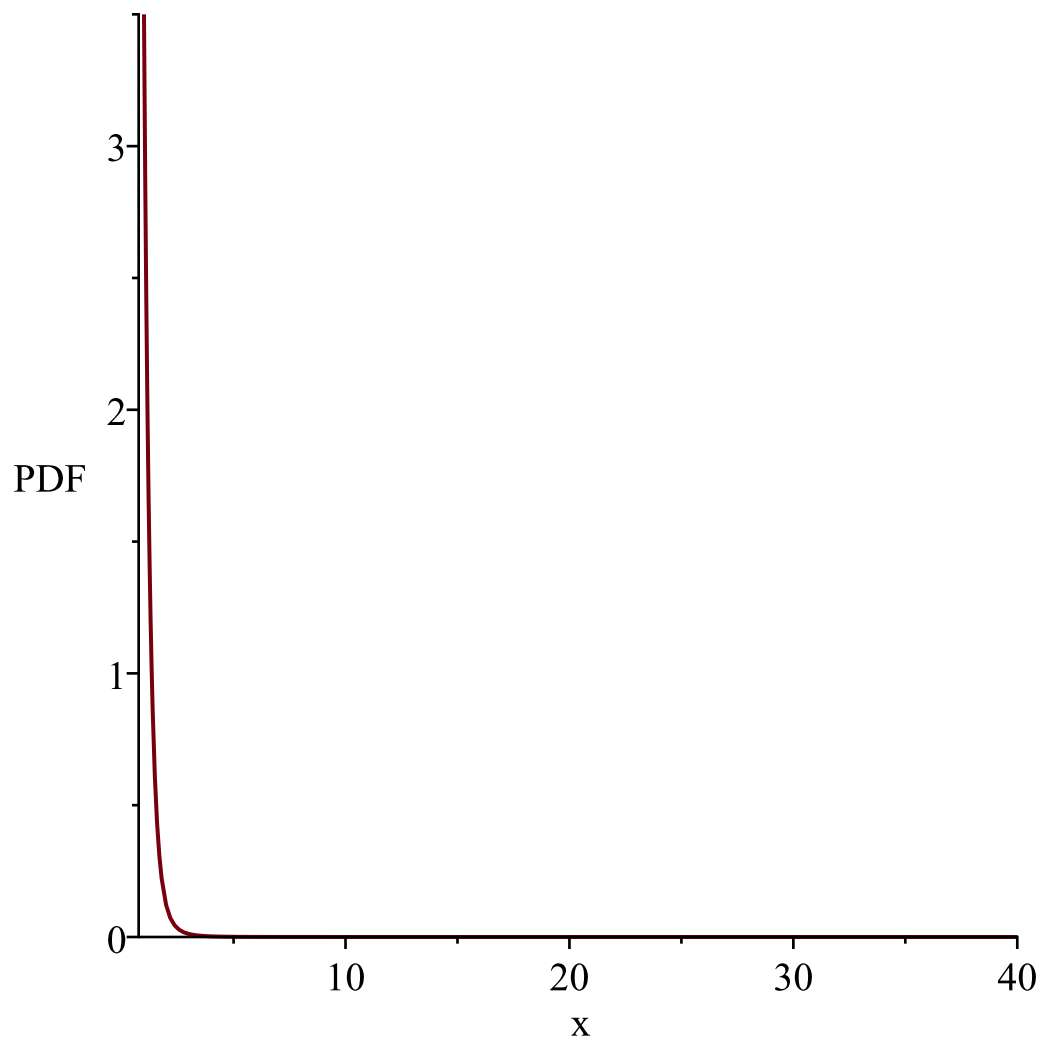
$$g := t \rightarrow \frac{1}{\operatorname{csch}(t)} + 1$$
$$l := 0$$
$$u := \infty$$

$$Temp := \left[\left[y \rightarrow \frac{1}{2} \frac{3 y + 1 + 3 \sqrt{y^2 - 2 y + 2}}{\left(y - 1 + \sqrt{y^2 - 2 y + 2} \right)^4 \sqrt{y^2 - 2 y + 2}} \right], [1, \infty], \right. \\ \left. ["Continuous", "PDF"] \right]$$

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

1

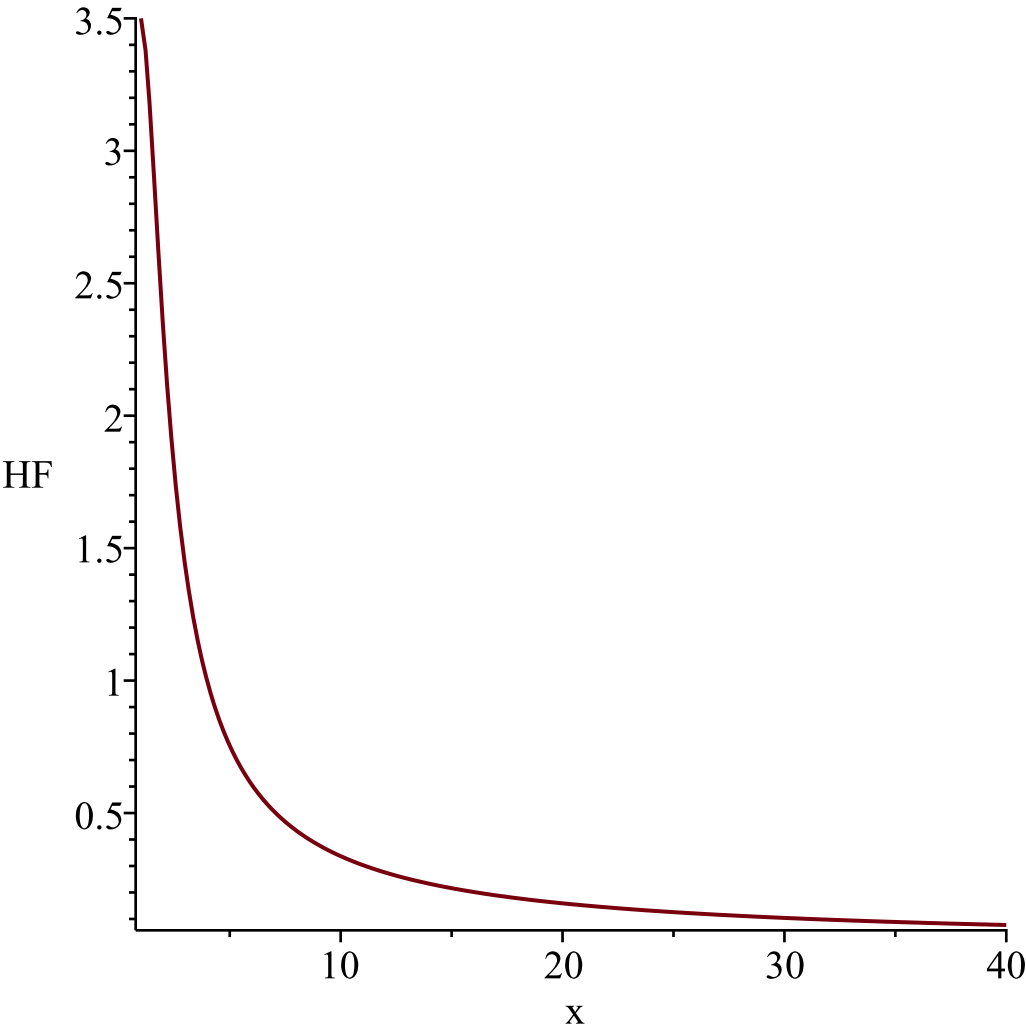
Resetting low to RV's minimum support value



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

1

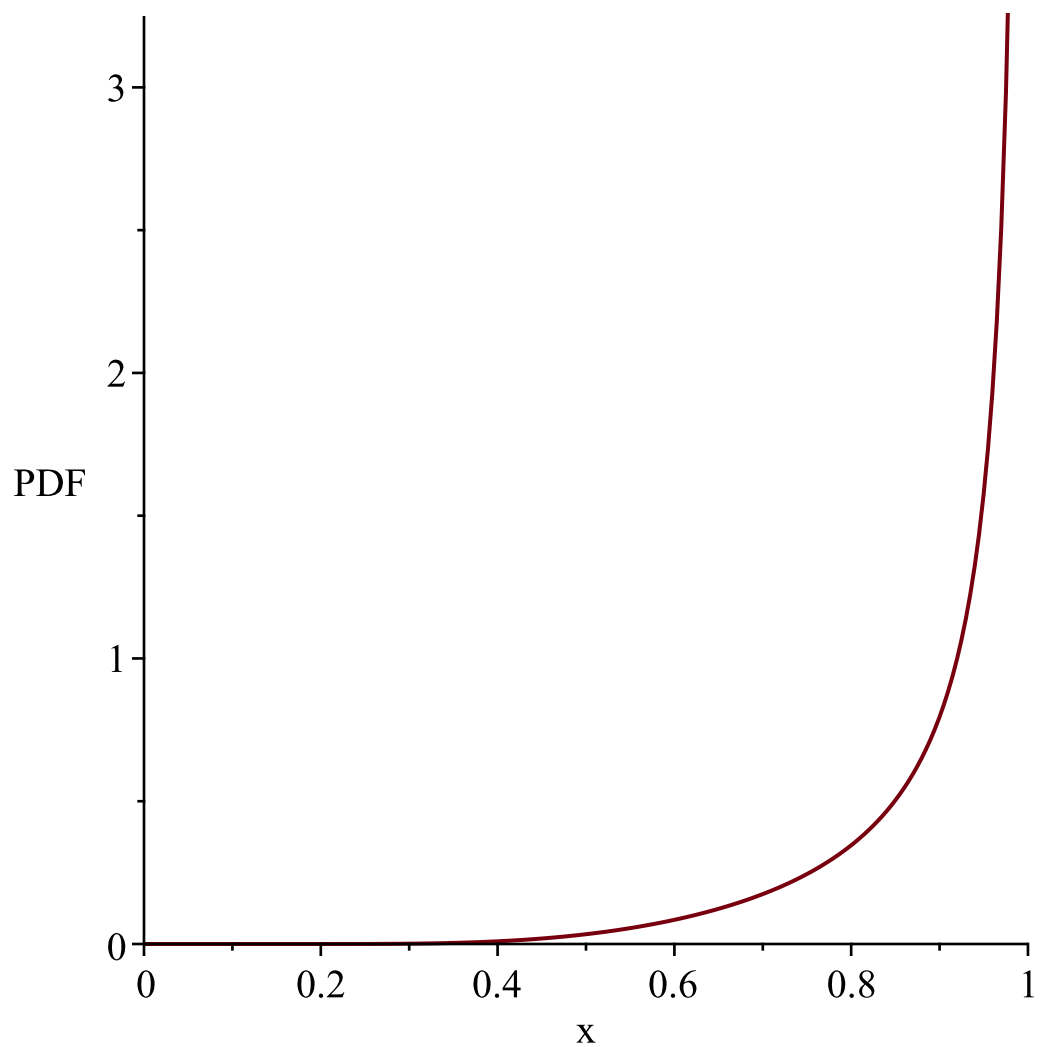
Resetting low to RV's minimum support value



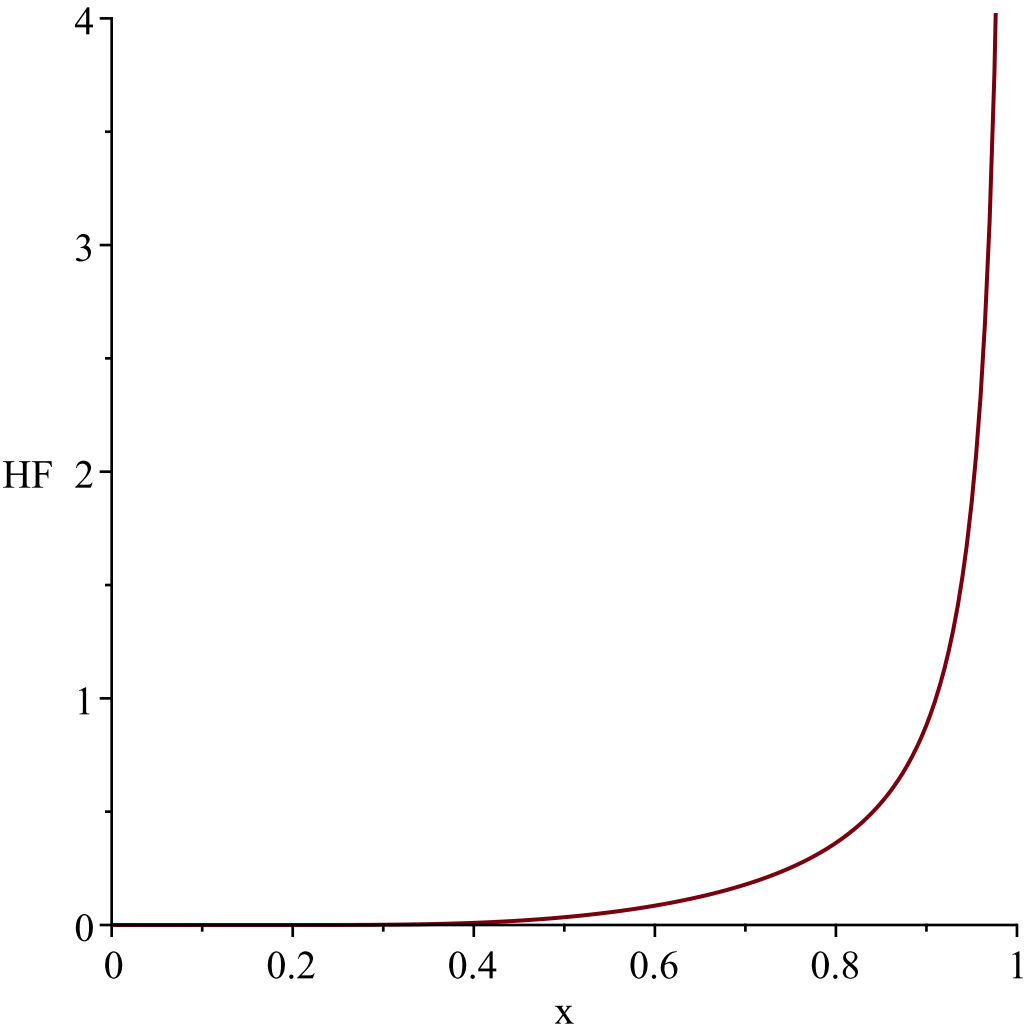
"i is", 20,
"-----"
"-----"

$$g := t \rightarrow \tanh\left(\frac{1}{t}\right)$$
$$l := 0$$
$$u := \infty$$
$$Temp := \left[\left[y \sim \rightarrow -\frac{1}{2} \frac{e^{-\frac{3}{\operatorname{arctanh}(y \sim)}} \left(3 + 4 e^{-\frac{1}{\operatorname{arctanh}(y \sim)}} \right)}{\operatorname{arctanh}(y \sim)^2 (y \sim^2 - 1)} \right], [0, 1], ["Continuous", "PDF"] \right]$$

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

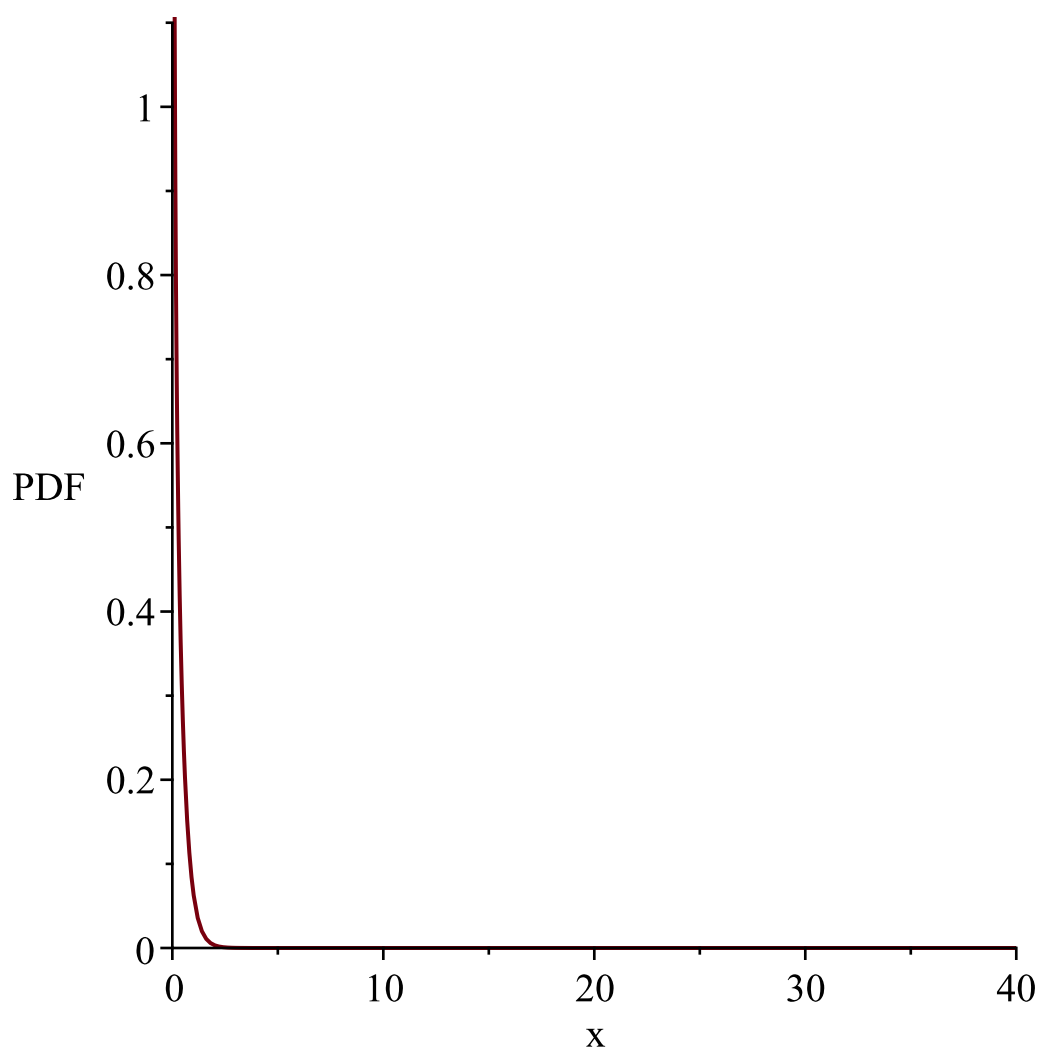


*WARNING(PlotDist): High value provided by user, 40
is greater than maximum support value of the random
variable, 1
Resetting high to RV's maximum support value*



"i is", 21,
 " _____"
 "_____"

$$\begin{array}{l}
 g:=t\rightarrow \operatorname{csch}\left(\frac{1}{t}\right)\\
 l:=0\\
 u:=\infty\\
 Temp:=\left[\left[y\sim\rightarrow\frac{1}{2}\frac{\operatorname{e}^{-\frac{3}{\operatorname{arccsch}(y\sim)}}\left(4\operatorname{e}^{-\frac{1}{\operatorname{arccsch}(y\sim)}}+3\right)}{\sqrt{y\sim^2+1}\operatorname{arccsch}(y\sim)^2|y\sim|}\right],\left[0,\infty\right],\left["\text{Continuous}","PDF"\right]\right]
 \end{array}$$



Warning, computation interrupted