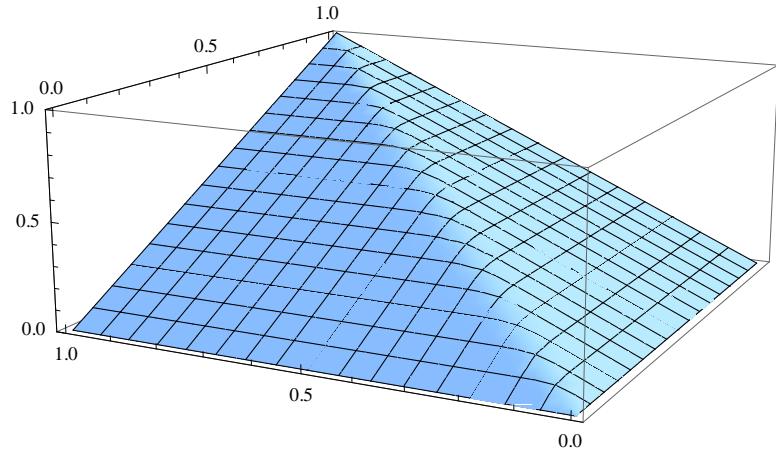


---

## Maximum copula

```
A = 15; Plot3D[c[x, y, A], {x, 0, 1}, {y, 0, 1}, PlotRange -> {0, 1}]
```



```
SeedRandom[];
```

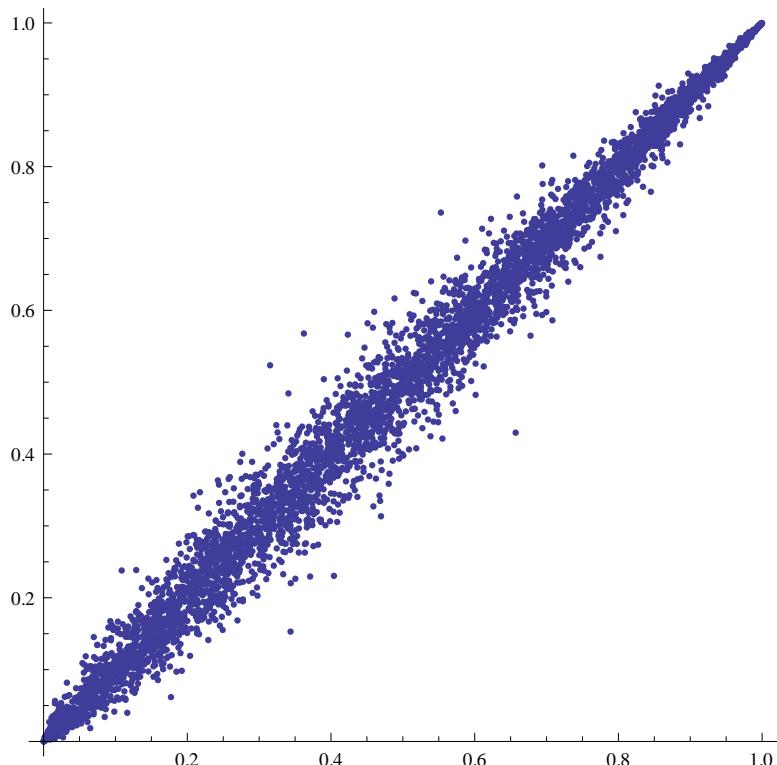
```
Y = .
```

```

U = {} ; A = 15 ;
Timing[For[i = 0, i < 5000, i++,
  x = RandomReal[];
  y = f[x, RandomReal[], A];
  AppendTo[U, {x, y}]]]
ListPlot[U, AspectRatio -> 1]

```

{0.651, Null}

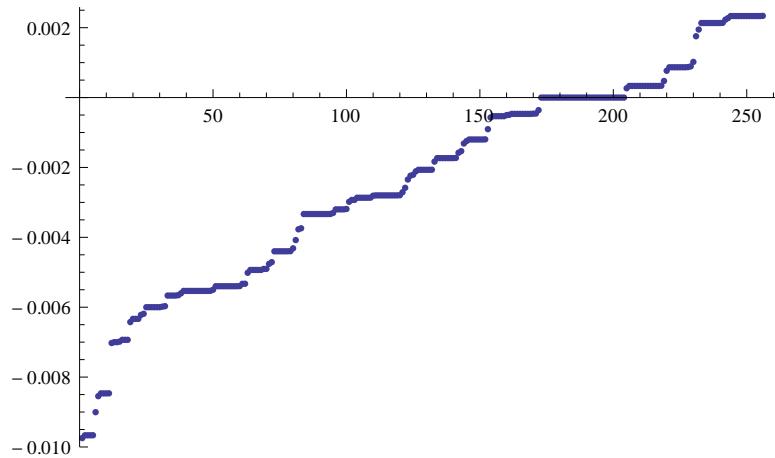


```

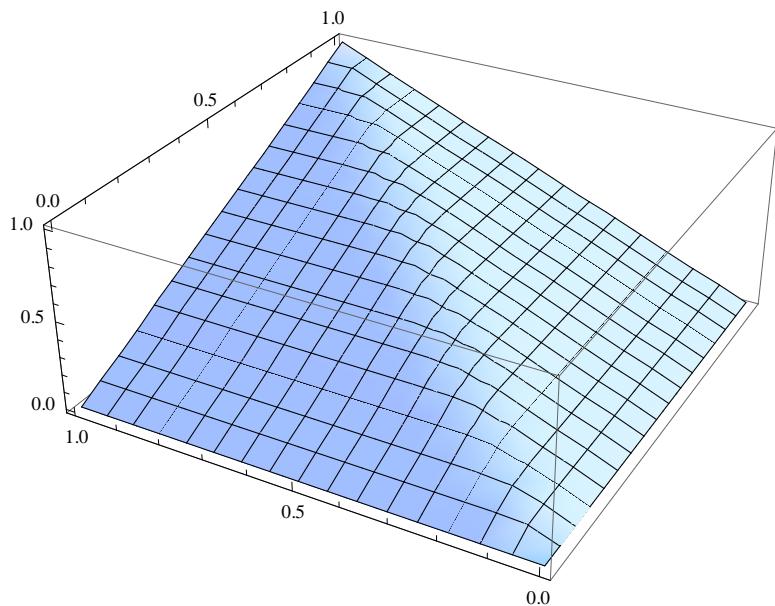
M = {} ; m = {} ; l = Length[U] ; h = 1 / 15 ; For[i = 0, i <= l, i += h,
  For[j = 0, j <= l, j += h,
    AppendTo[m, Length[Select[U, #[[1]] <= i && #[[2]] <= j &]] / l - c[i, j, A] // N]
    AppendTo[M, {i, j, Length[Select[U, #[[1]] <= i && #[[2]] <= j &]] / l} // N]
  ]
]; m = Sort[m];

```

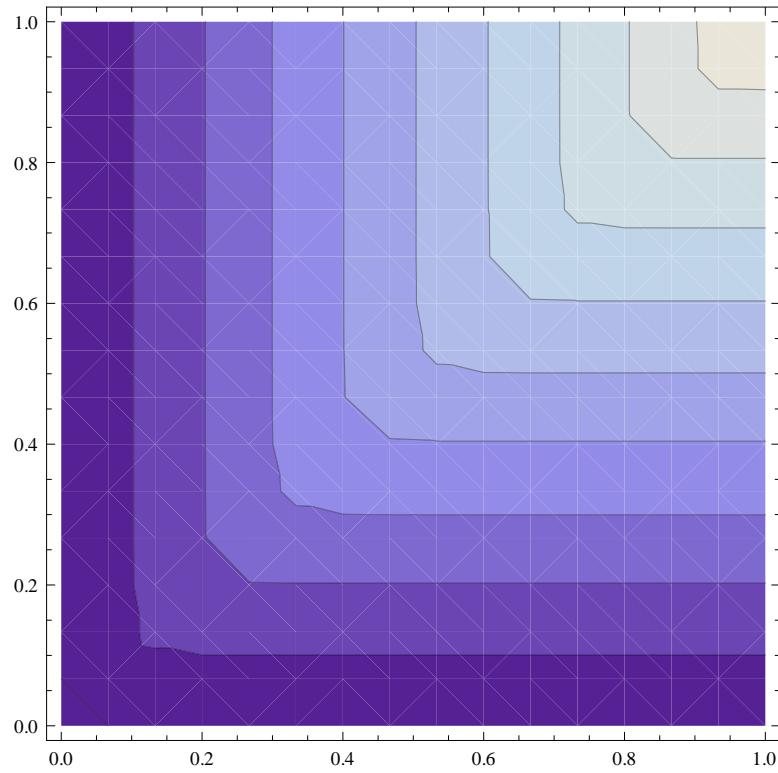
```
ListPlot [Transpose[m] [[3]]]
```



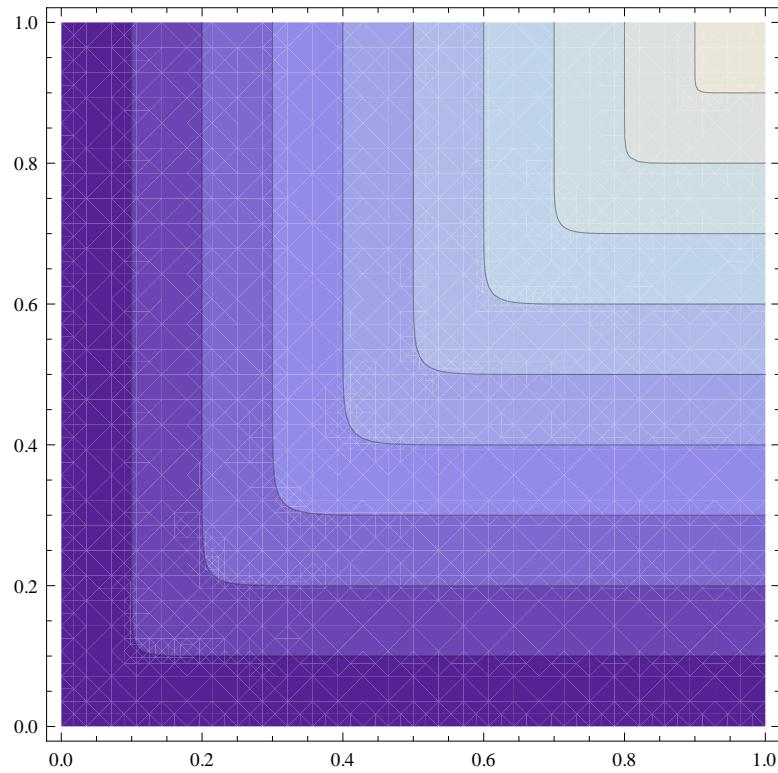
```
ListPlot3D [M]
```



```
ListContourPlot[M]
```



```
ContourPlot[c[x, y, 15], {x, 0, 1}, {y, 0, 1}]
```

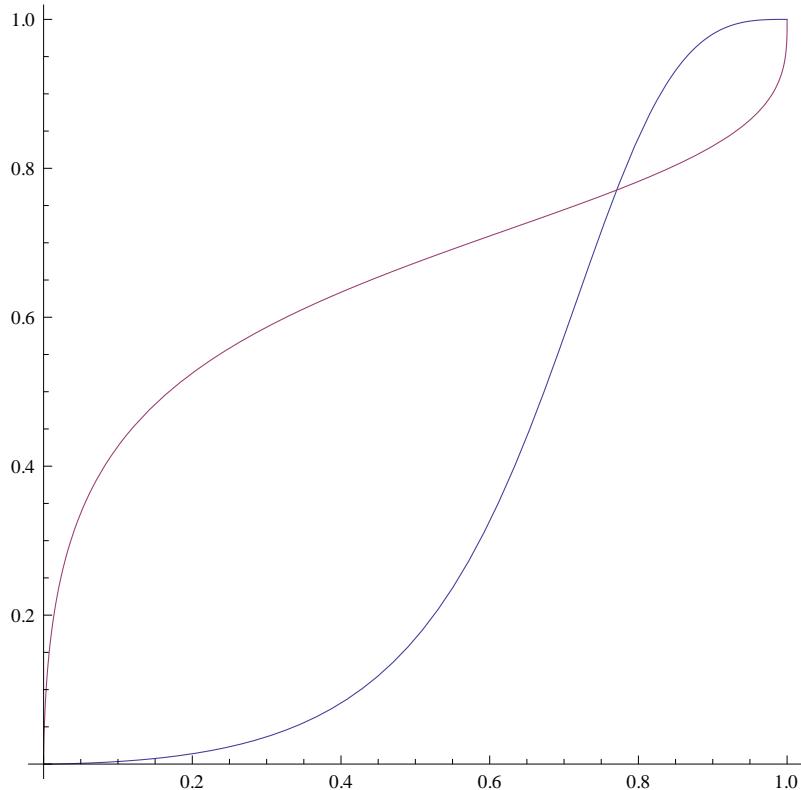


```

f = Compile[{{x, _Real}, {z, _Real}, {a, _Real}},
  -(-Log[x])^a + ProductLog[(-x z (-Log[x])^-a Log[x])^(-1/a)]^a]^1/a];
c[x_, y_, a_] := Exp[-((-Log[x])^a + (-Log[y])^a)^a^(1/a)]
SetDelayed::write : Tag Rational in 1/15[x_, y_, a_] is Protected. >>
$Failed
c =.

xx = 0.7; a = 3; Plot[{D[c[x, y, a], x] /. x -> xx, f[y, a, xx]}, {y, 0, 1}, PlotRange -> All, AspectRatio -> 1]

```



D[c[x, y, a], x]

f[AA, BB, CC]

```

f[AA, BB, CC] =
  -(-Log[CC])^BB + ProductLog[(-AA CC (-Log[CC])^-BB Log[CC])^(-1/BB)]^BB]^1/BB;

```

```
Solve[D[c[x, y, A], x] == z, y]
```

InverseFunction::ifun :

Inverse functions are being used. Values may be lost for multivalued inverses. >>

Solve::ifun : Inverse functions are being used by Solve, so some

solutions may not be found; use Reduce for complete solution information. >>

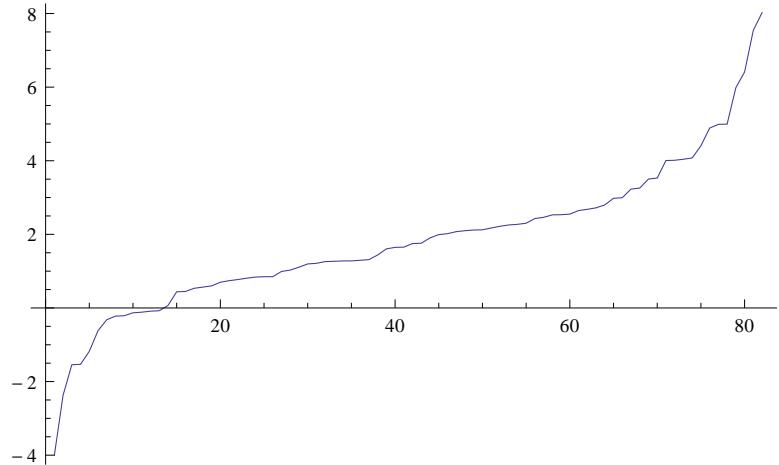
$$\left\{ \left\{ y \rightarrow e^{-\left( -(-\text{Log}[x])^A + \left( (-1+A) \text{ProductLog}\left[ \frac{\left( -x Z (-\text{Log}[x])^{-A} \text{Log}[x] \right)^{-\frac{1}{-1+A}}}{-1+A} \right] \right)^{\frac{1}{A}} \right)^A} \right\} \right\}$$

```
$Assumptions = a > 1 && 0 < z < 1 && 0 < x < 1
```

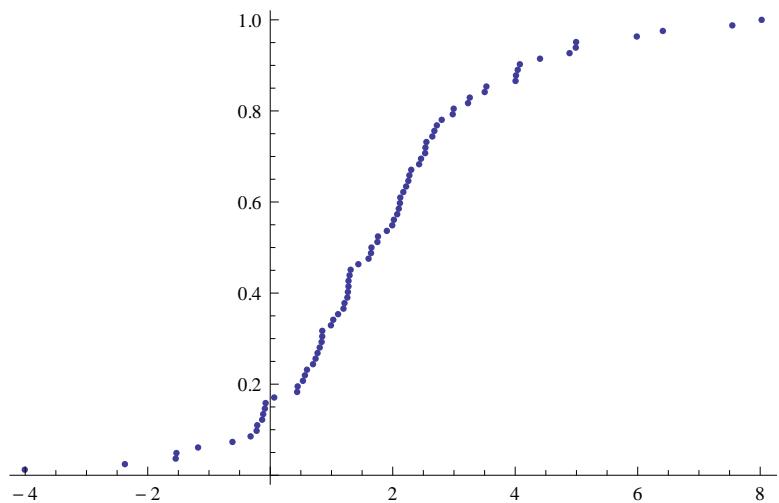
```
a > 1 && 0 < z < 1 && 0 < x < 1
```

```
a =.
```

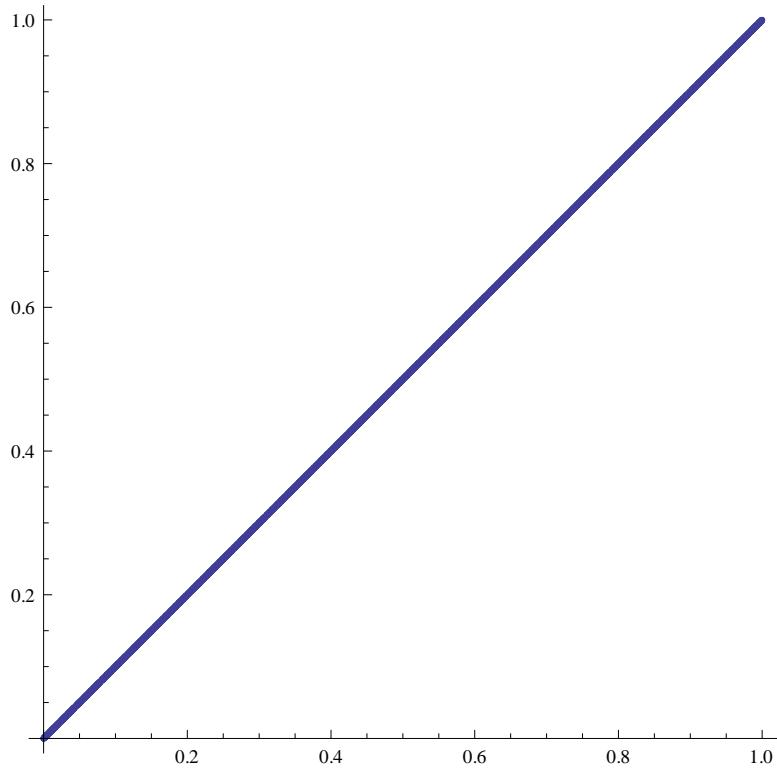
```
U = Sort[RandomReal[NormalDistribution[2, 2], 82]];
ListPlot[U, Joined -> True]
n = Length[U]
F = Table[{U[[i]], i/n}, {i, 1, n}];
ListPlot[F]
```



82



```
ListPlot[U, AspectRatio -> 1]
```



```
F[a_, b_] := 10 000 - Sort[
  Tally[UnitStep[a - #1[[2]]] UnitStep[b - #1[[1]]] & /@ U], #1[[1]] < #2[[1]] &][[1, 2]]
Sort[Tally[UnitStep[20 / 20 - #1[[2]]] UnitStep[20 / 20 - #1[[1]]] & /@ U],
  #1[[1]] < #2[[1]] &]
{{1, 10 000}]

n = 40; G = {};
For[i = 0, i < n, i++,
  For[j = 0, j < n, j++,
    AppendTo[G, {i/n, j/n, F[i/n, j/n]}];
  ]]
G[[3]]
{0, 1/10, 0}
```

```
ListPlot3D[G, PlotRange → All, BoxRatios → {1, 1, 1}]
```

