

De Rham-Bernoulli singular function, Example 7

```

derhamr_rand2(x, a, n, rnd):=block( [ z:floor(rnd*2), q:a ],
if not numberp(n) then return('derhamr_rand2(x, a, n, rnd)),
if x =0 then return(0),
if x =1 then return(1),
if n>0 then (
  rnd:rnd*2-z,
  if z=1 then (a:1-a),
  if x <=1/2 then
    a*derhamr_rand2(2*x, q, n-1, rnd)
  else
    (1-a)*derhamr_rand2(2*x-1, q, n-1, rnd)+a
) else
  x
)$

```

De Rham-Bernoulli singular function - fractional velocity,  
Example 7

```

derhamr_randd2(x, a, n, rnd):=block( [ z:floor(rnd*2), q:a, b:max(a,1-a) ],
if not numberp(n) then return('derhamr_randd2(x, a, n, rnd)),
if x =0 then return(0),
if x =1 then return(1),
if n>0 then (
  rnd:rnd*2-z,
  if z=1 then (a:1-a),
  if x <=1/2 then
    a/b*derhamr_randd2(2*x, q, n-1, rnd)
  else
    (1-a)/b*derhamr_randd2(2*x-1, q, n-1, rnd)
) else
  1
)$

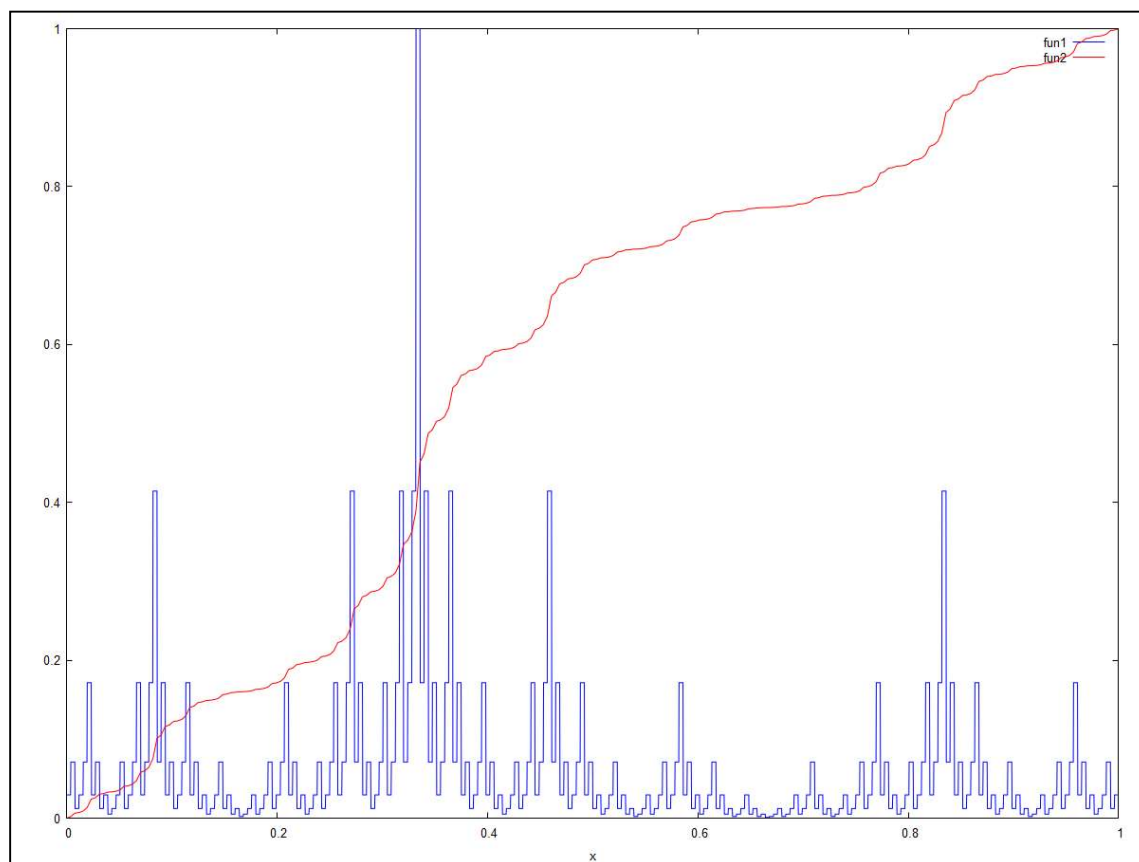
```

```

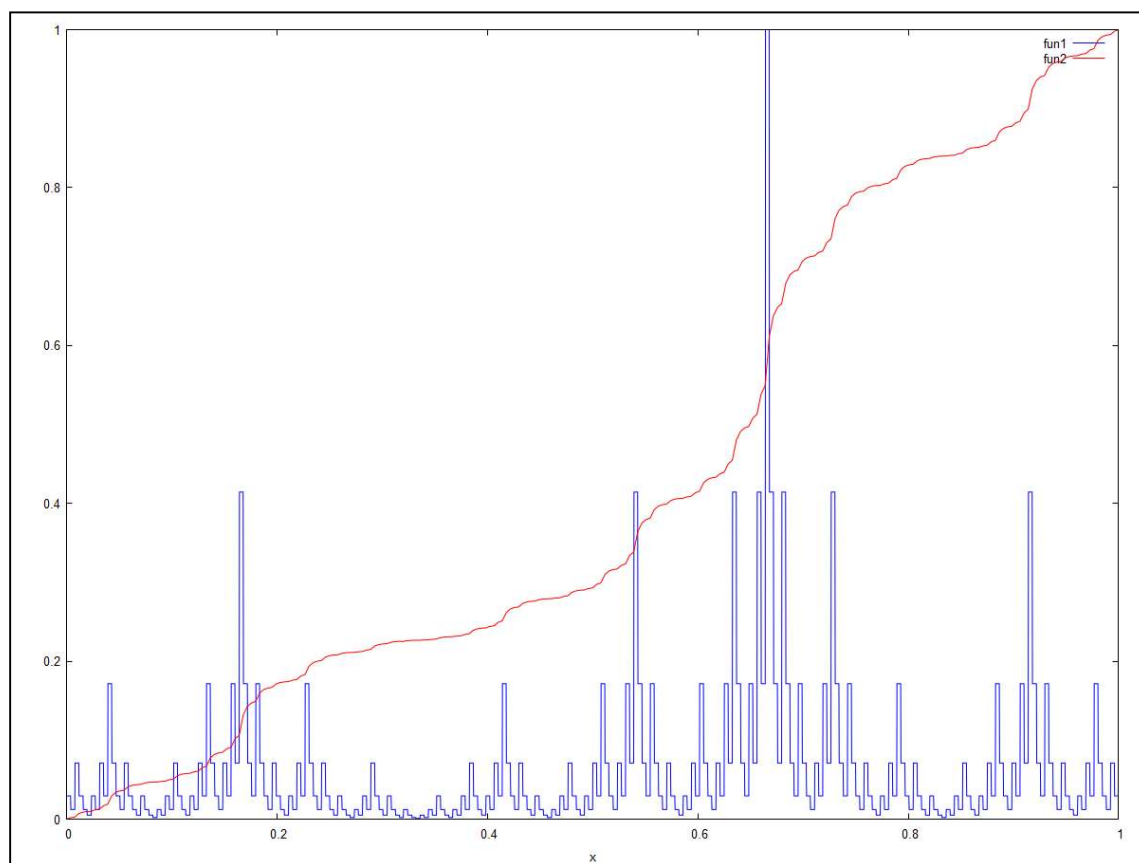
wxplot2d([derhamr_randd2(x, 1/sqrt(2), 8, 1/3), derhamr_rand2(x, 1/sqrt(2), 8, 1/3)

```

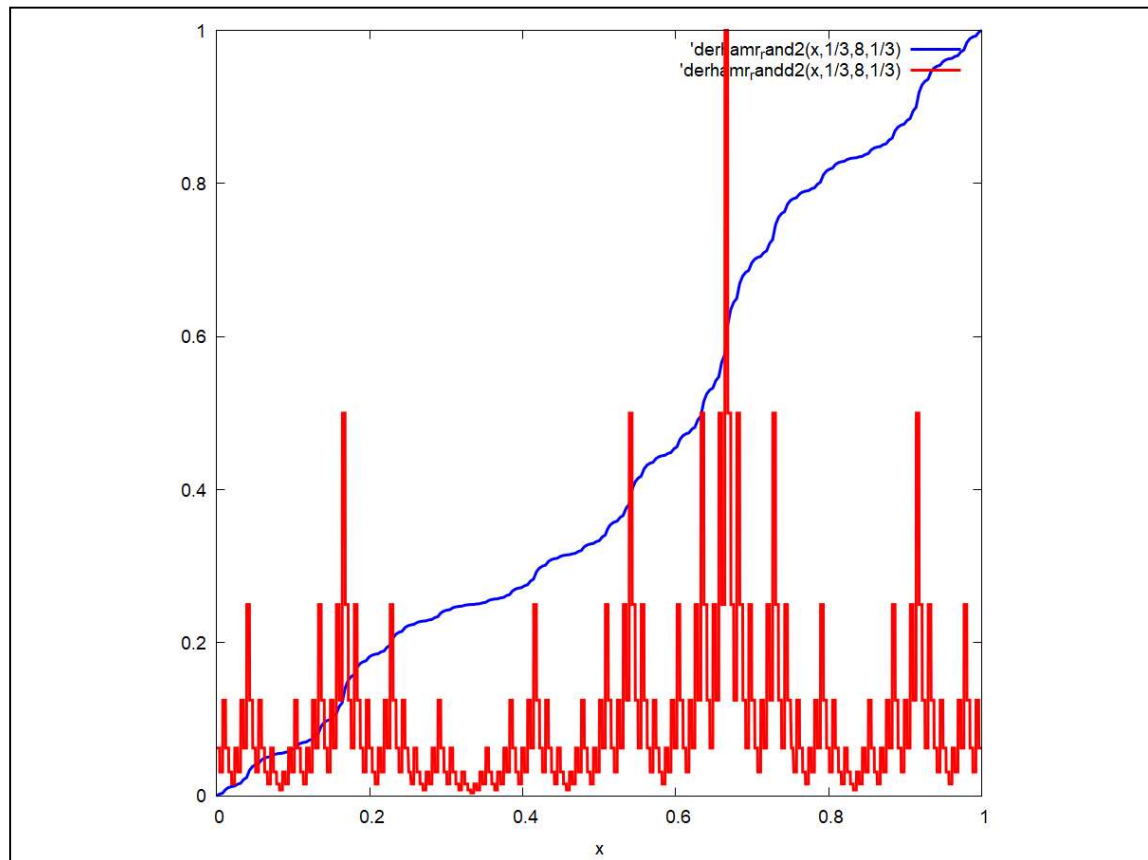
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`wxplot2d([derhamr_randd2(x, 1/sqrt(2), 8, 2/3), derhamr_rand2(x, 1/sqrt(2), 8, 2/3)`



`wxplot2d(['derhamr_rand2(x, 1/3, 8, 1/3)', 'derhamr_randd2(x, 1/3, 8, 1/3)], [x,0,1`



***derhamr\_rand2(1/4, 1/3, 8, 1/3);***

$$\frac{2}{9}$$

```

neid(x, a, n):=block( [ q:a ],
if not numberp(n) then return('neid(x, a, n)),
if x =0 then return(0),
if x =1 then return(1),
if n>0 then (

if evenp(n) then (a:1-a),
if x <= 1/2 then
  a*neid(2*x, q, n-1)
else
  (1-a)*neid(2*x-1, q, n-1)+a
) else
  x
);

```

neid(x,a,n):=block([q:a],if not numberp(n) then  
return(neid(x,a,n)) ,if x=0 then return(0) ,if x=1 then return(1) ,if

$n > 0$  then (if evenp( $n$ ) then  $a:1-a$  ,if  $x \leq \frac{1}{2}$  then  $a$   
 neid( $2x, q, n-1$ ) else  $(1-a)$  neid( $2x-1, q, n-1$ )+ $a$ ) else  $x$ )

**neid(1/4, 1/3, 8);**

$$\frac{2}{9}$$

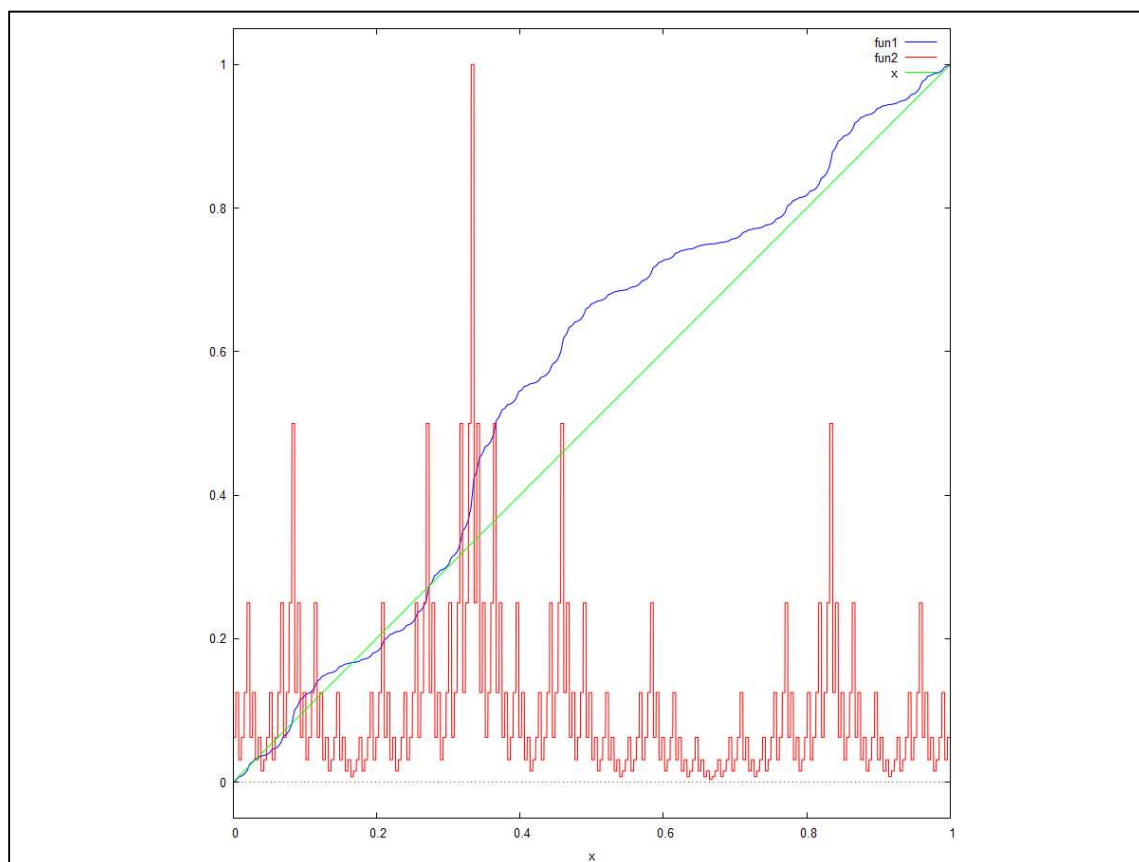
**neidd(x, a, n):=block( [ q:a, b:max(a,1-a) ],  
 if not numberp(n) then return('neidd(x, a, n)),  
 if x =0 then return(0),  
 if x =1 then return(1),  
 if n>0 then (  
  
 if evenp(n) then (a:1-a),  
 if x <= 1/2 then  
 a/b\*neidd(2\*x, q, n-1)  
 else  
 (1-a)/b\*neidd(2\*x-1, q, n-1)  
 ) else  
 1  
 );**

neidd( $x, a, n$ ):=block([q:a, b:max(a,1-a)],if notnumberp(n)  
 then return(neidd( $x, a, n$ )) ,if  $x=0$  then return(0) ,if  $x=1$  then  
 return(1) ,if  $n > 0$  then (if evenp( $n$ ) then  $a:1-a$  ,if  $x \leq \frac{1}{2}$  then  $\frac{a}{b}$   
 neidd( $2x, q, n-1$ ) else  $\frac{1-a}{b}$  neidd( $2x-1, q, n-1$ )) else 1)

**neidd(1/4, 1/3, 8);**

$$\frac{1}{2}$$

**wxplot2d([neid(x, 1/3, 8),neidd(x, 1/3, 8),x ], [x,0,1], same\_xy)\$**



`wxplot2d(['derham_rand2(x, 1/3, 8, 2/3)', 'derham_randd2(x, 1/3, 8, 2/3)'], [x, 0, 1])`

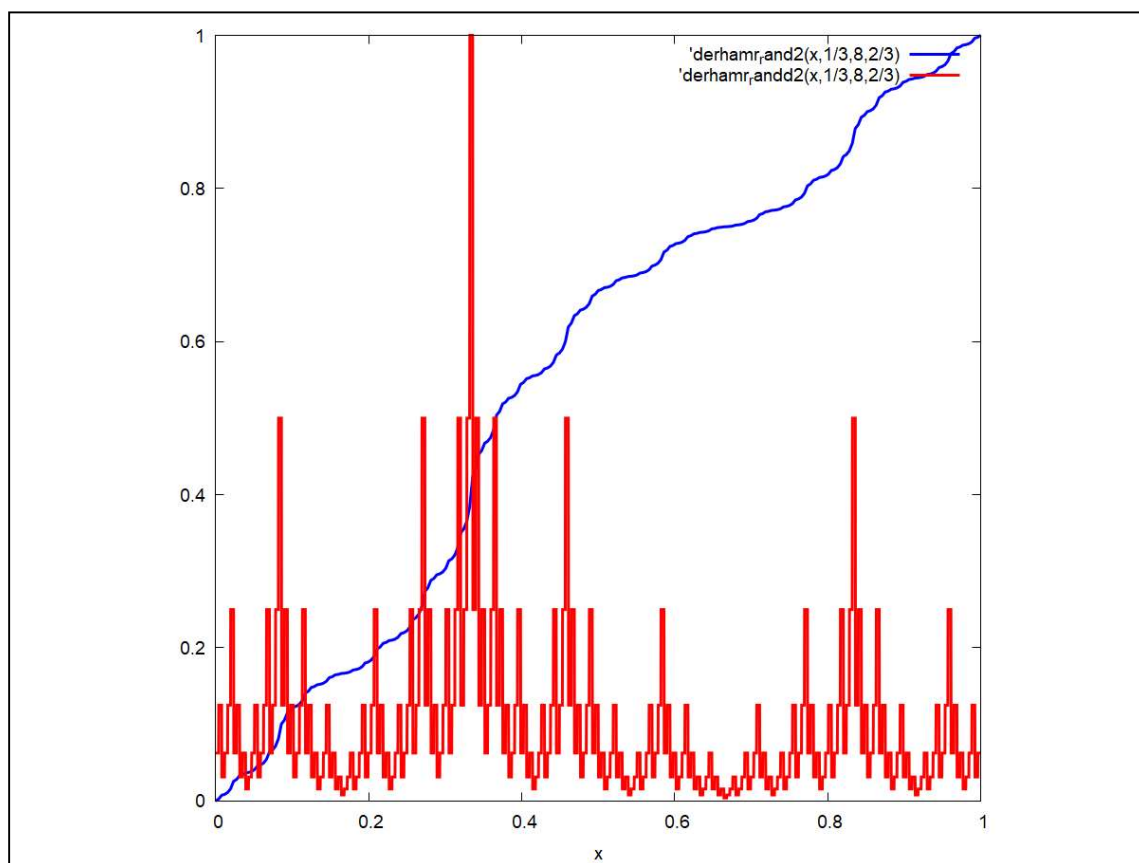
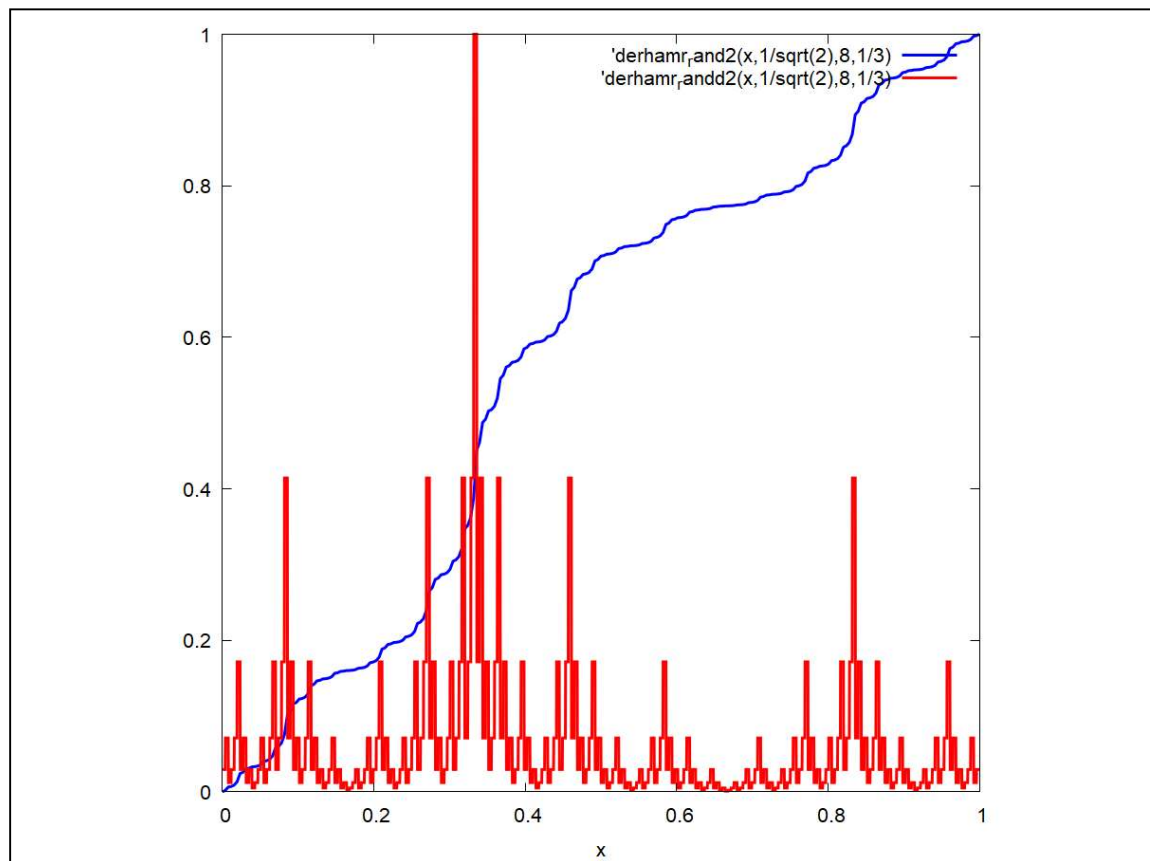
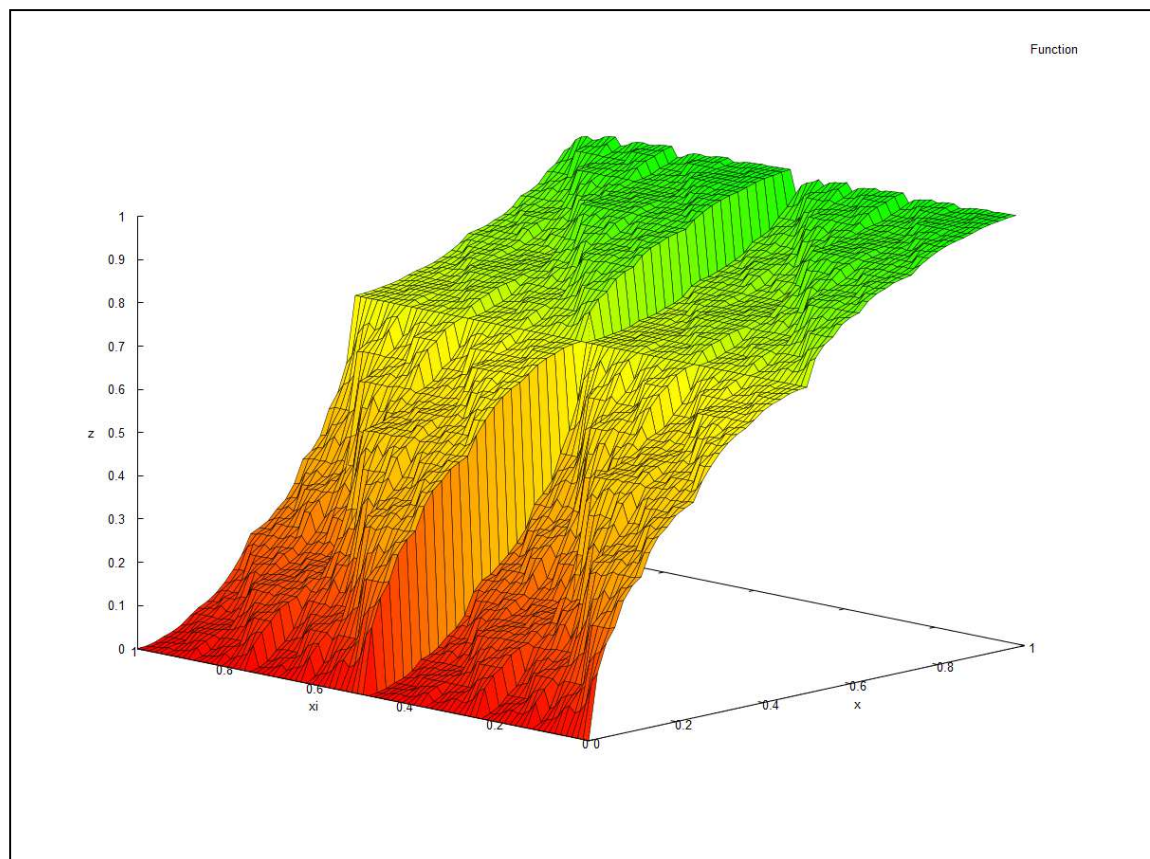


Fig 1.A

**`wxplot2d(['derhamr_rand2(x, 1/sqrt(2), 8, 1/3)', 'derhamr_randd2(x, 1/sqrt(2), 8, 1/3)']`**

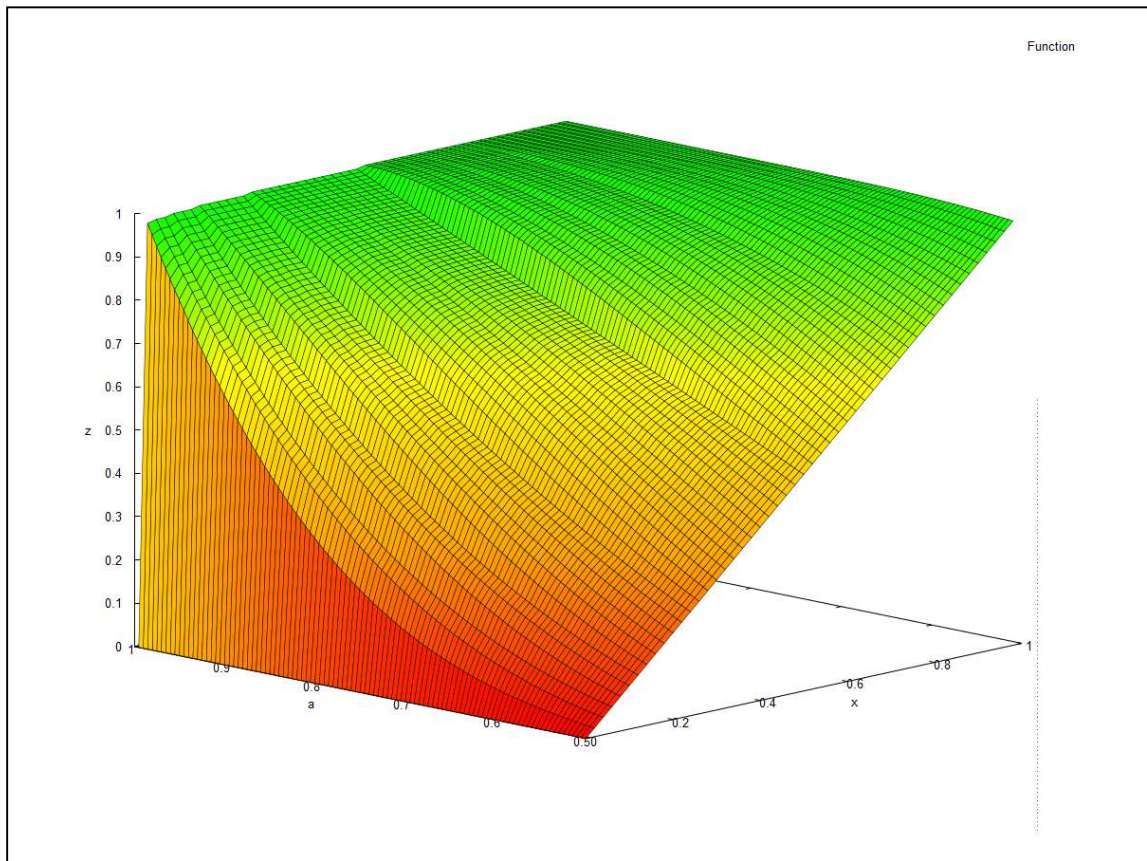


**`wxplot3d(derhamr_rand2(x, 1/sqrt(2), 8, xi), [x,0,1], [xi,0,1], [grid, 50, 80], [palet`**





**`wxplot3d`**(**`derhamr_rand2`**(**`x`**, **`a`**, 8, 1), [**`x`**,0,1], [**`a`**,1/2,1], [**`grid`**, 50, 100], [**`palette`**, [gr



**`wxplot3d`**(**`derhamr_randd2`**(**`x`**, **`a`**, 8, 1), [**`x`**,0,1], [**`a`**,1/2,1], [**`grid`**, 50, 100], [**`palette`**, [g

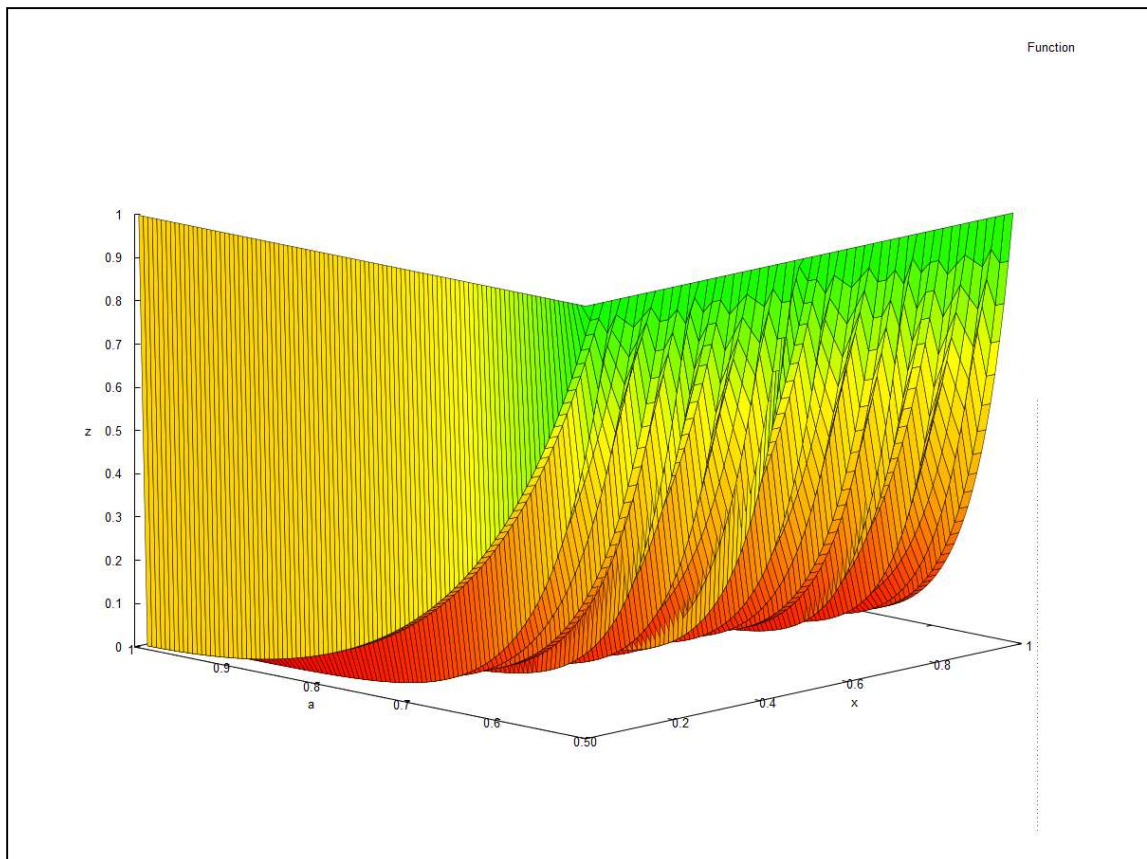


Fig. 1.B

**`wxplot2d(['derhamr_and2(x, 1/sqrt(2), 8, 2/3), 'derhamr_randd2(x, 1/sqrt(2), 8, 2/3)`**

