Dror Bar-Natan: Talks: Fields-0911:

Dror Bar-Natan: Academic Pensieve: 2009-11:

Hilbert's 13th Problem

Pensieve Header: Hilbert's 13th problem - Step 1.

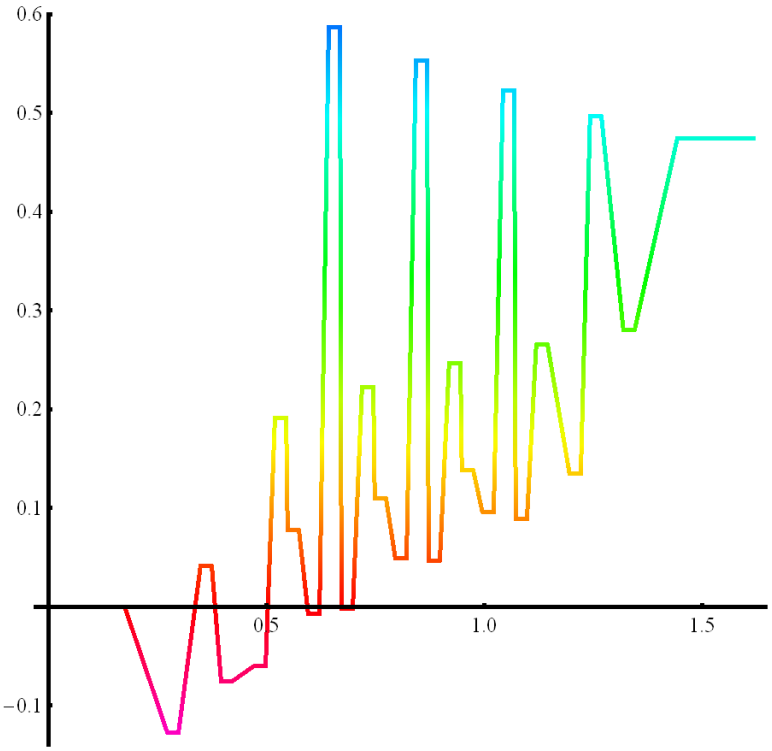
```
<< C:\drorbn\AcademicPensieve\2009-11\Hilbert13th-Program.m
```

```
phi5 := Phi[phi0, 5, 0.1, 0.8];
g = G[f, phi5];
```

```
Step1G = Rasterize[
  Plot[
   g[z], {z, 0, 1 + λ},
   PlotStyle → Thick, AxesStyle → Thick
  ]
 ]
```

InterpolatingFunction::dmval :

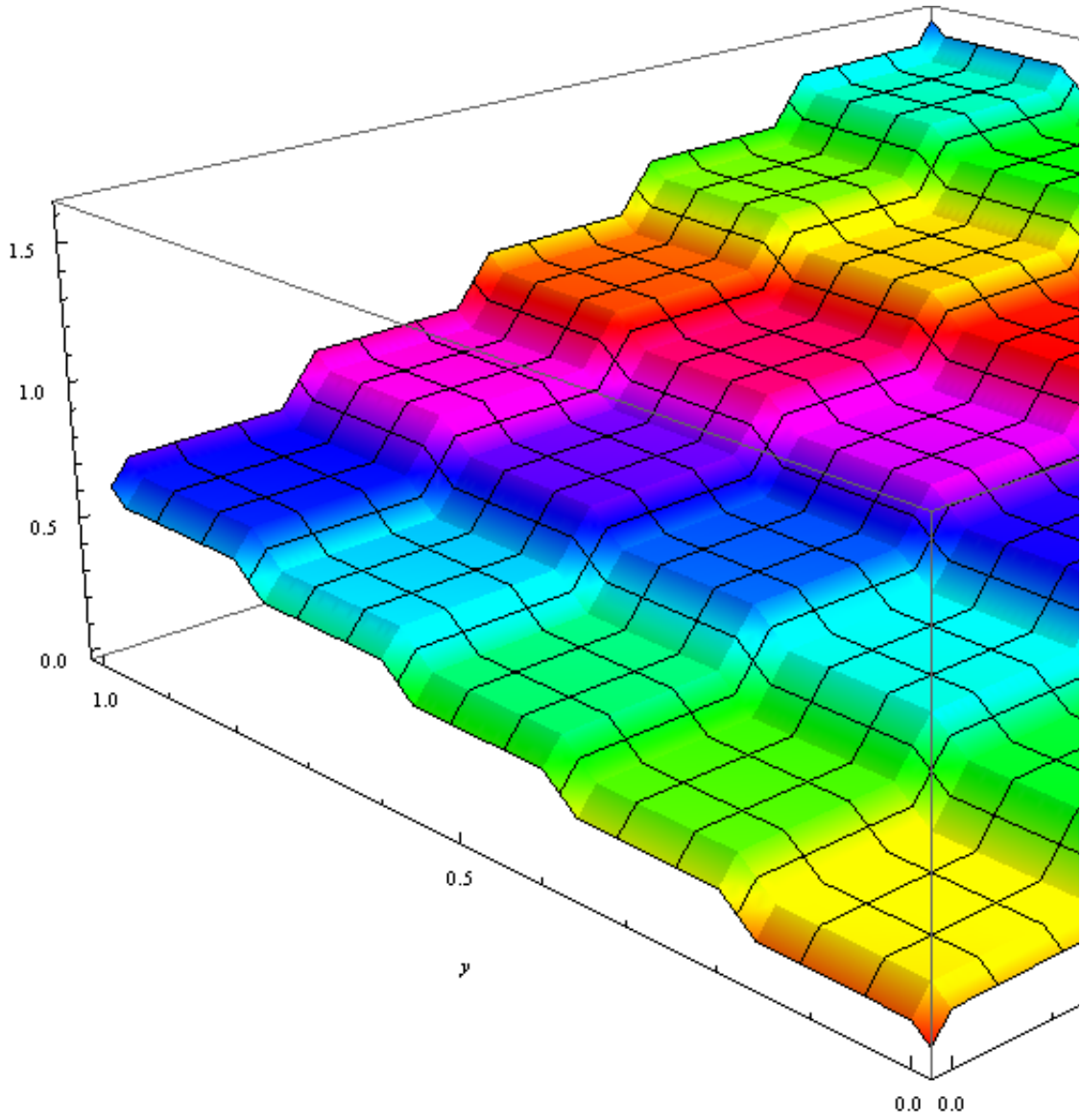
Input value {0.0000330541} lies outside the range of data in the interpolating function. Extrapolation will be used. ≫




```
Export[
 "C:/drorbn/AcademicPensieve/2009-11/Step1G.png",
 ImageCrop[Step1G]
]
```

C:/drorbn/AcademicPensieve/2009-11/Step1G.png

```
Timing[
 Step1Cascade = Rasterize[
   Plot3D[phi5[x] + λ * phi5[y], {x, 0, 1}, {y, 0, 1},
    PlotPoints → 51, Mesh → 14, Exclusions → None,
    ViewPoint → {-2, -2, 1}, AxesLabel → Automatic, NormalsFunction → None
   ]
  ]
]
```



{5.194,

```
Export[
 "C:/drorbn/AcademicPensieve/2009-11/Step1Cascade.png",
 ImageCrop[Step1Cascade]
]
```

C:/drorbn/AcademicPensieve/2009-11/Step1Cascade.png

```
Timing[
 Step1CascadeWithG = Rasterize[
   Plot3D[phi5[x] + λ * phi5[y], {x, 0, 1}, {y, 0, 1},
    PlotPoints → 301, Mesh → 14, Exclusions → None, ViewPoint → {-2, -2, 1},
    AxesLabel → Automatic, NormalsFunction → None, ColorFunction → (Hue[g[#3]] &)
   ]
  ]
]
```

InterpolatingFunction::dmval :

Input value $\{2.48099 \times 10^{-8}\}$ lies outside the range of data in the interpolating function. Extrapolation will be used. ≫

InterpolatingFunction::dmval :

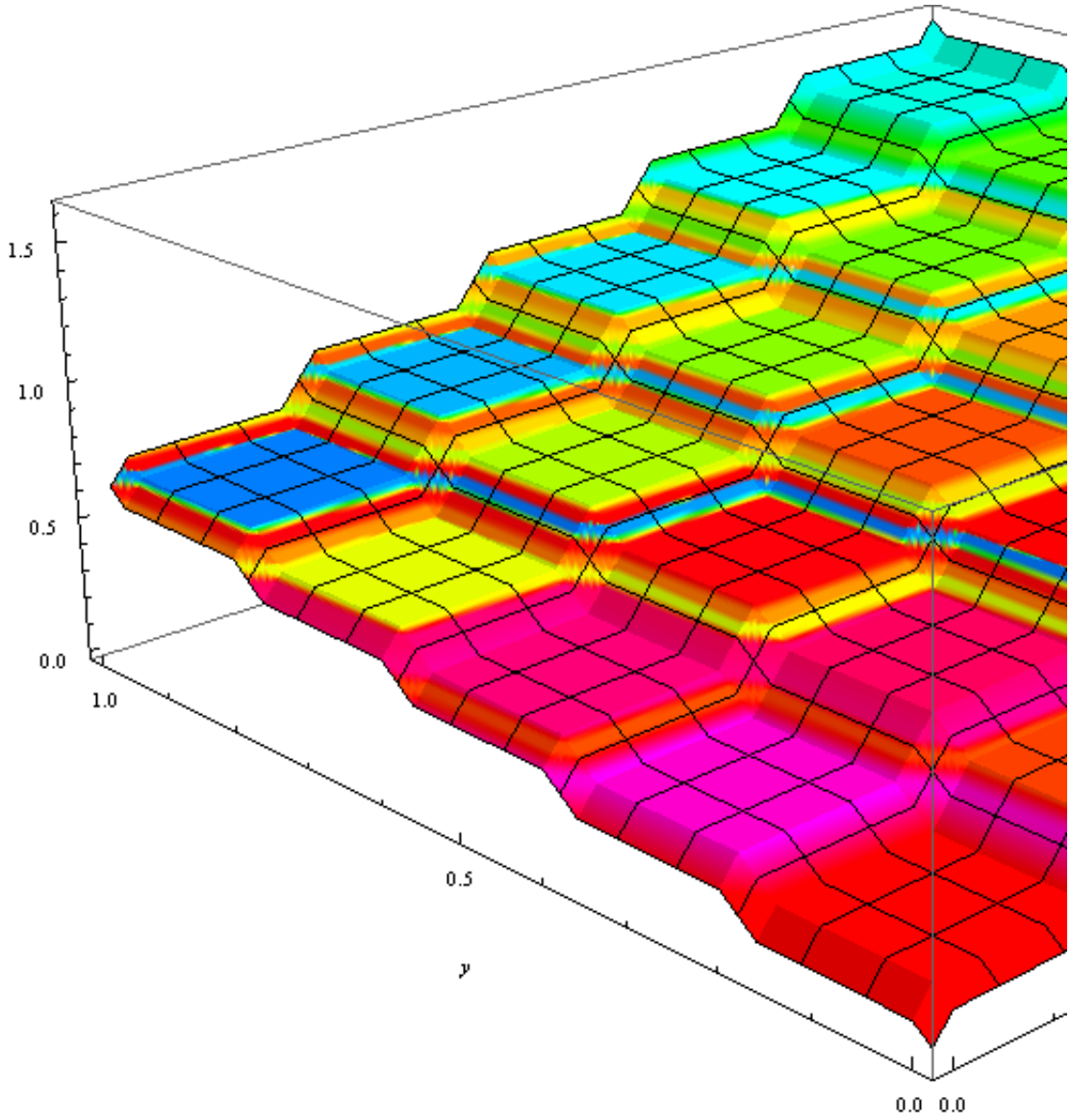
Input value {0.0153334} lies outside the range of data in the interpolating function. Extrapolation will be used. ≫

InterpolatingFunction::dmval :

Input value {0.0306667} lies outside the range of data in the interpolating function. Extrapolation will be used. ≫

General::stop : Further output of InterpolatingFunction::dmval will be suppressed during this calculation. ≫

{56.815,




```
Export[
 "C:/drorbn/AcademicPensieve/2009-11/Step1CascadeWithG.png",
 ImageCrop[Step1CascadeWithG]
]
```

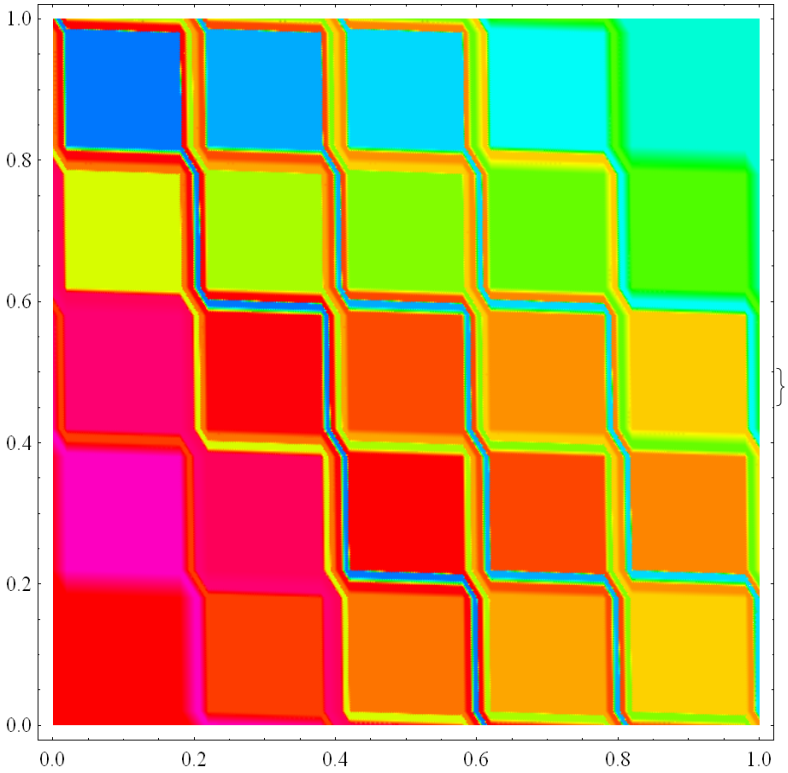
C:/drorbn/AcademicPensieve/2009-11/Step1CascadeWithG.png

```
Timing[
 Step1Density = Rasterize[
   DensityPlot[
    g[phi5[x] + λ * phi5[y]], {x, 0, 1}, {y, 0, 1}
   ]
  ]
]
```

InterpolatingFunction::dmval :

Input value {0.0000499527} lies outside the range of data in the interpolating function. Extrapolation will be used. ≫

{32.105,



}

```
Export[
 "C:/drorbn/AcademicPensieve/2009-11/Step1Density.png",
 ImageCrop[Step1Density]
]
```

C:/drorbn/AcademicPensieve/2009-11/Step1Density.png