

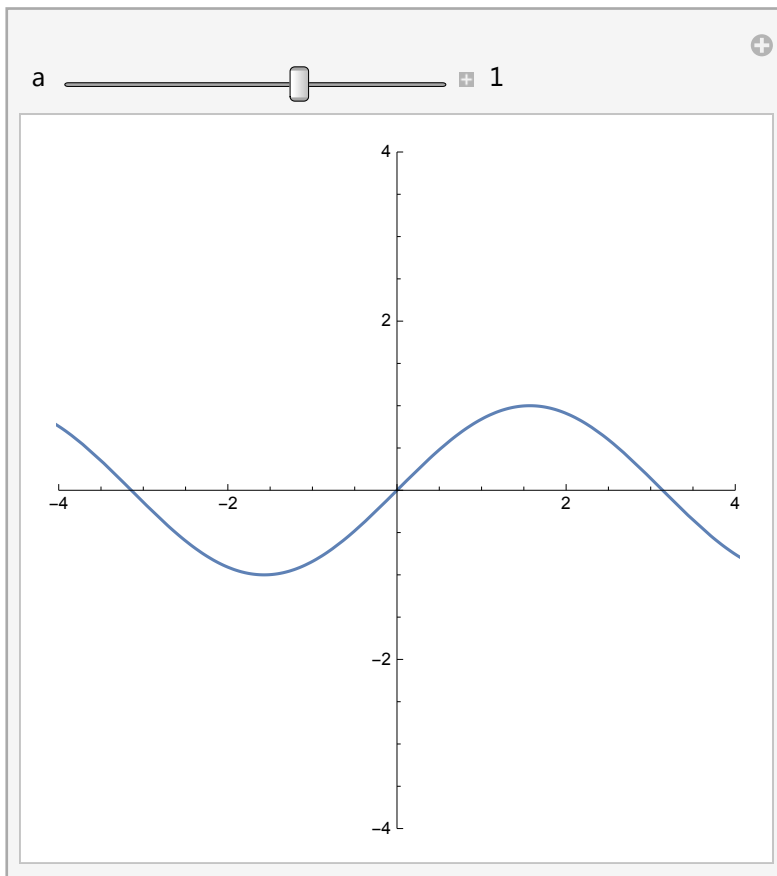
Freezing a family of functions

This *Mathematica* CDF notebook shows the development of the CDF files displayed in the post **Freezing a family of functions**. It is licensed under a **Creative Commons Attribution – ShareAlike 3.0 License**. I hope anyone interested will feel free to improve this work and to use it in their own publications and coursework.

Charles Wells

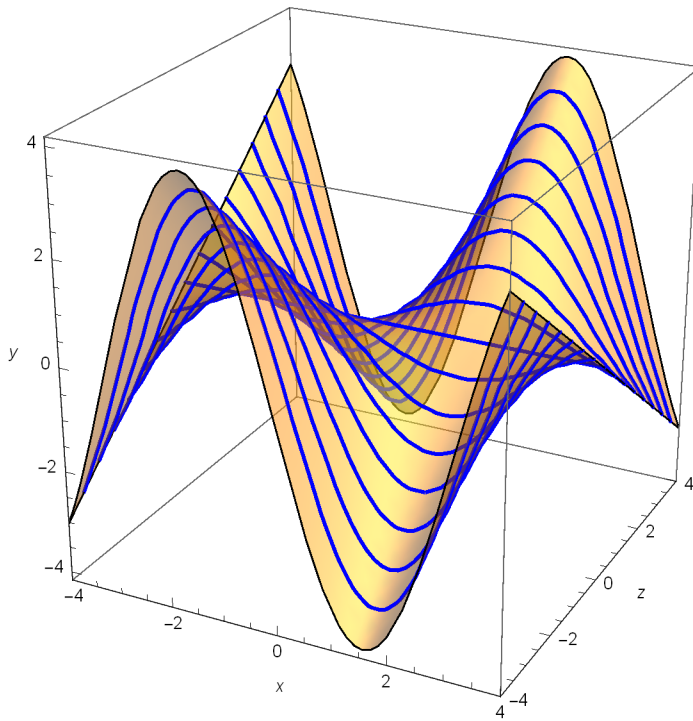
A family of functions shown interactively

```
Manipulate[Plot[a Sin[x], {x, -2 Pi, 2 Pi}, PlotRange -> {{-4, 4}, {-4, 4}},  
  AspectRatio -> 1], {{a, 1}, -4, 4, Appearance -> "Labeled"}]
```

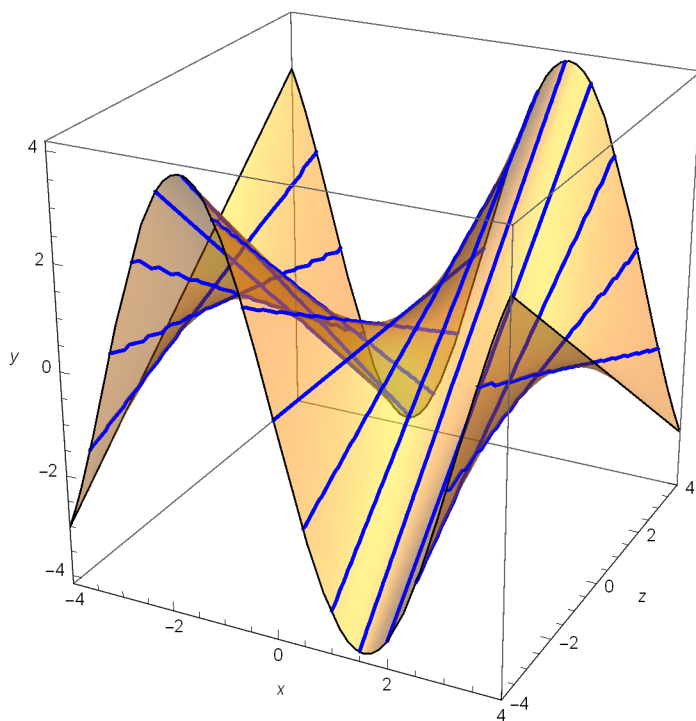


Cross Sections

```
Plot3D[  
  z Sin[x],  
  {x, -4, 4},  
  {z, -4, 4},  
  PlotRange -> {{-4, 4}, {-4, 4}},  
  BoxRatios -> {1, 1, 1},  
  AxesLabel -> {x, z, y},  
  PlotStyle -> Opacity[.5],  
  ViewPoint -> {2, -4, 2},  
  MeshStyle -> {Transparent, {Thick, Blue}}]
```

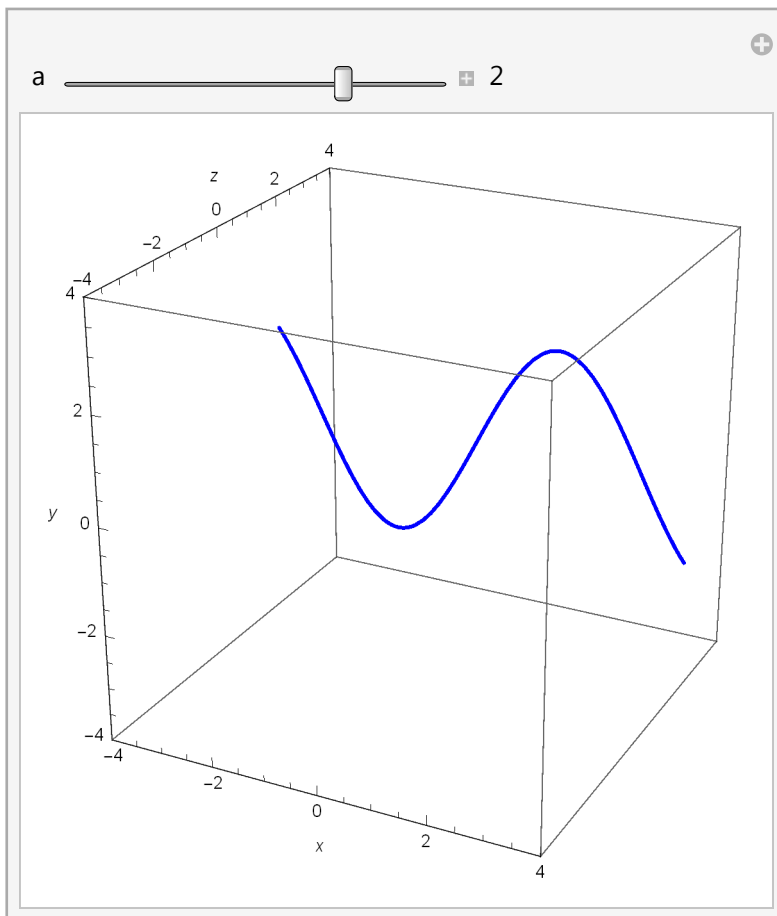


```
Plot3D[  
  z Sin[x],  
  {x, -4, 4},  
  {z, -4, 4},  
  PlotRange -> {{-4, 4}, {-4, 4}},  
  BoxRatios -> {1, 1, 1},  
  AxesLabel -> {x, z, y},  
  PlotStyle -> Opacity[.5],  
  ViewPoint -> {2, -4, 2},  
  MeshStyle -> {{Thick, Blue}, Transparent}]
```



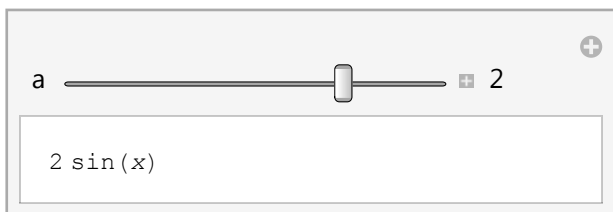
Graph of a function whose output is a (graph of a) function

```
Manipulate[
  ParametricPlot3D[
    {x, a, a Sin[x]},
    {x, -4, 4},
    PlotRange → {{-4, 4}, {-4, 4}, {-4, 4}},
    BoxRatios → {1, 1, 1},
    PlotStyle → {Thick, Blue},
    AxesLabel → {x, z, y},
    ViewPoint → {2, -4, 2}
  ],
  {{a, 2}, -4, 4, Appearance → "Labeled"}
]
```



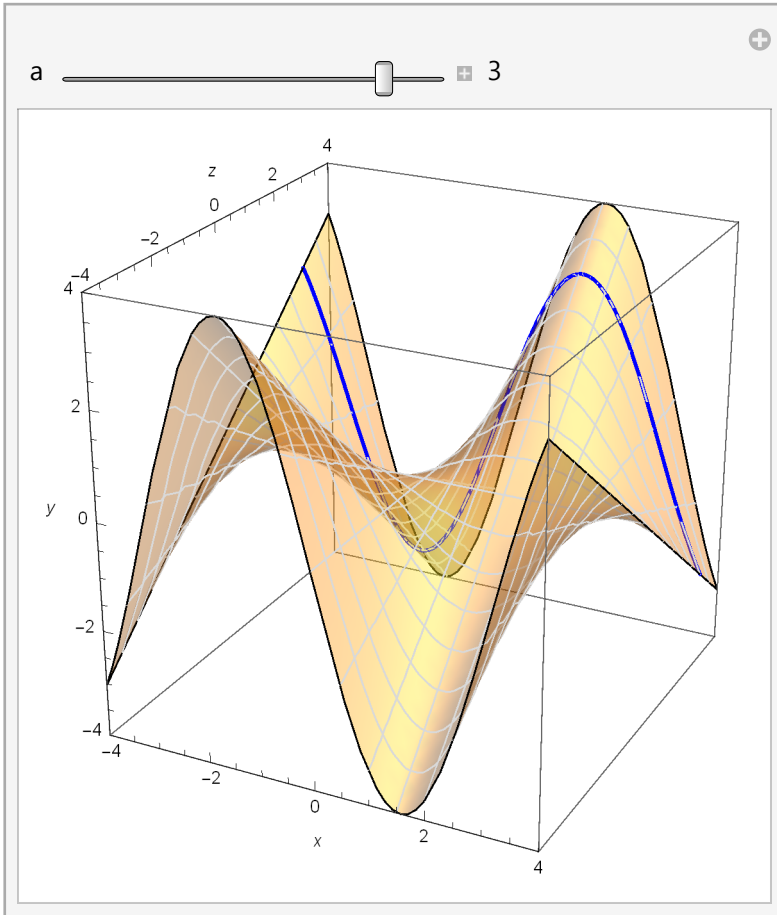
Graph of the family with output shown as formula

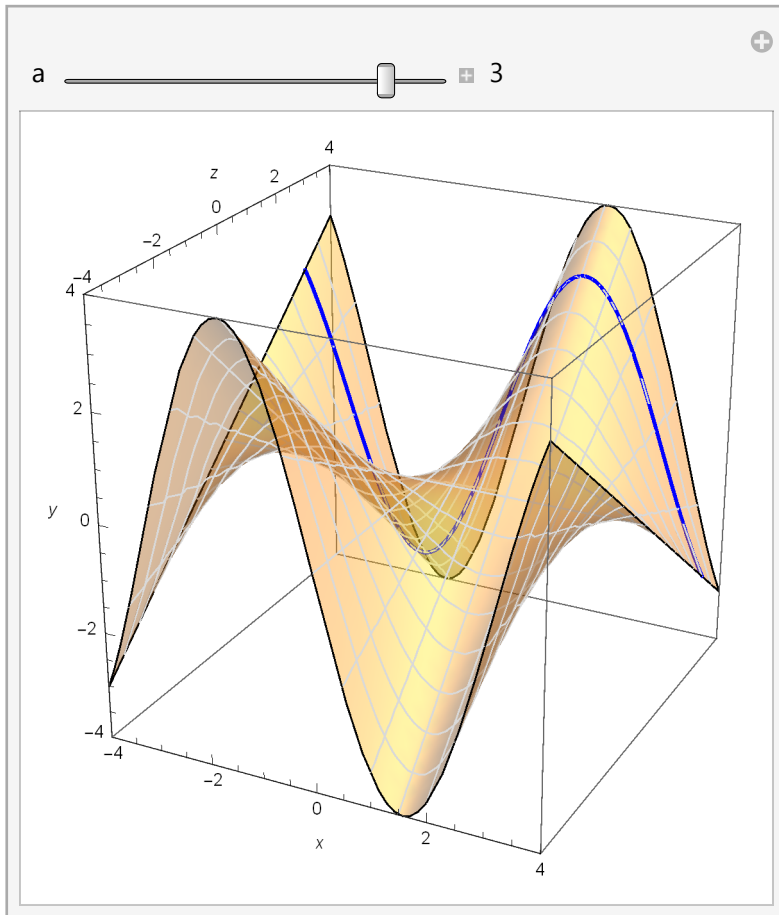
```
Manipulate[a Sin[x] // TraditionalForm,
  {{a, 2}, -4, 4, Appearance -> "Labeled"}
]
```



Manipulate

```
Manipulate[
  Show[
    Plot3D[
      z Sin[x],
      {x, -4, 4},
      {z, -4, 4},
      PlotRange -> {{-4, 4}, {-4, 4}, {-4, 4}},
      BoxRatios -> {1, 1, 1},
      AxesLabel -> {x, z, y},
      PlotStyle -> Opacity[.4],
      ViewPoint -> {2, -4, 2},
      MeshStyle -> LightGray
    ],
    ParametricPlot3D[
      {x, a, a Sin[x]},
      {x, -4, 4},
      PlotRange -> {{-4, 4}, {-4, 4}, {-4, 4}},
      BoxRatios -> {1, 1, 1},
      PlotStyle -> {Thick, Blue},
      AxesLabel -> {x, z, y},
      ViewPoint -> {2, -4, 2}
    ]
  ],
  {{a, 3}, -4, 4, Appearance -> "Labeled"}
]
```





```

Manipulate[
  Plot3D[
    z Sin[x],
    {x, -4, 4},
    {z, -4, 4},
    PlotRange -> {{-4, 4}, {-4, 4}},
    BoxRatios -> {1, 1, 1},
    AxesLabel -> {x, z, y},
    PlotStyle -> Opacity[.5],
    ViewPoint -> {2, -4, 2},
    MeshStyle -> {LightGray, If[
      ShowCurves, {Thick, Blue}, LightGray
    ]}},
  {{ShowCurves, False}, {True, False}}
]

```

