Approximating the Cantor Function

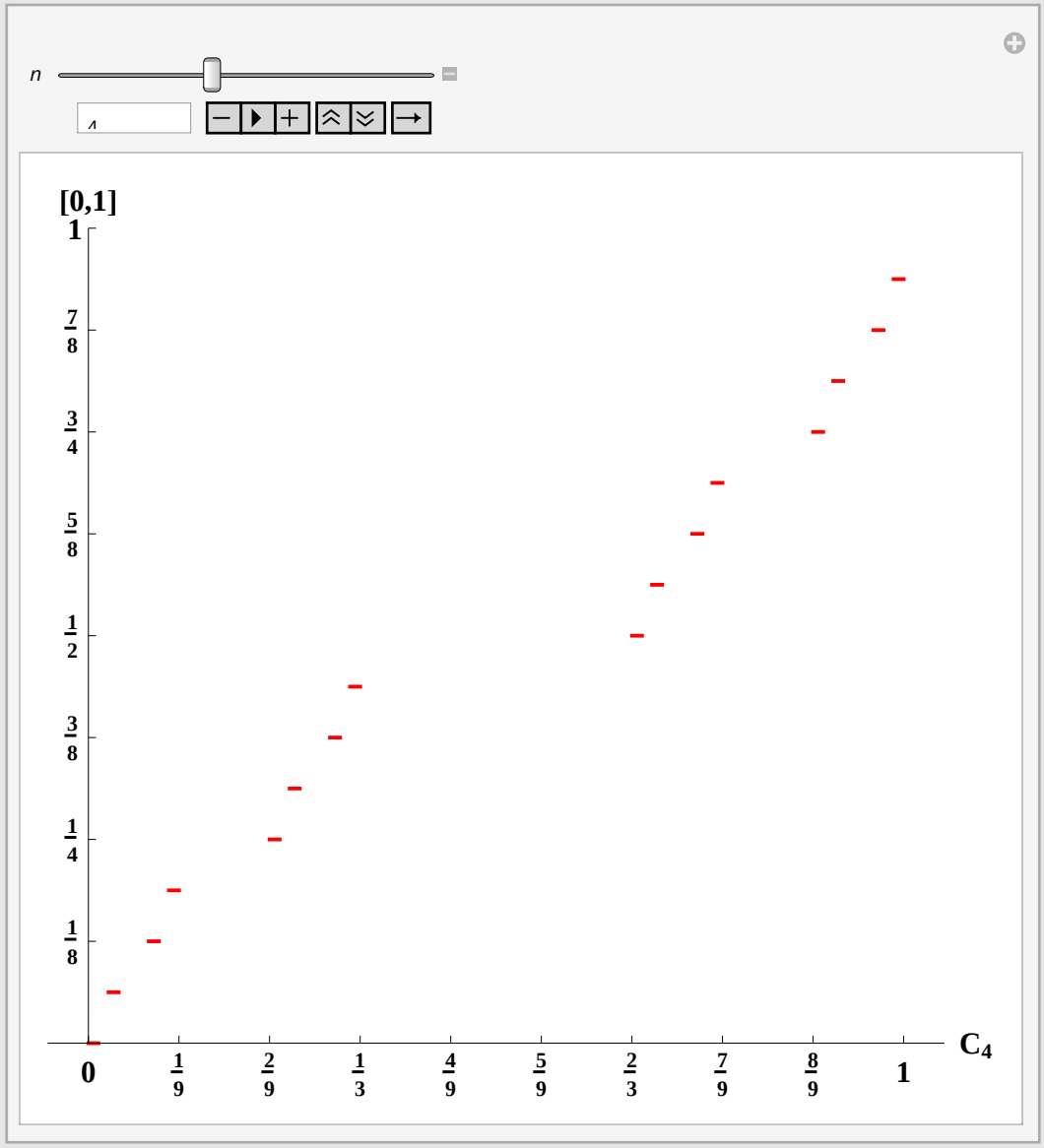
Helmut Knaust, Department of Mathematical Sciences, UTEP, El Paso TX 79968
hknaust@utep.edu
9/29/09

First approach

In[13]:=

```
m[0] = {Line[{{0, 0}, {1, 0}}]};
m[n_] :=
 m[n] = Flatten[m[n - 1] /. Line[{a_, b_}] -> {Line[{a, {a[[1]] + 1 / 3^n, a[[2]]}}],
      Line[{{a[[1]] + 2 / 3^n, a[[2]] + 1 / 2^n}, {b[[1]], b[[2]] + 1 / 2^n}}]}]
Manipulate[Show[Graphics[{Red, Thick, m[n]}], AxesLabel →
   {Row[{Subscript["C", n]}], "[0,1]"}, PlotRange → {0, 1},
  PlotRangePadding → {0.05}, BaseStyle → {16, Bold}, ImageSize → 500, Axes → True,
  Ticks → {Table[k / 9, {k, 0, 9}], Table[k / 8, {k, 0, 8}]}], {n, 0, 10, 1}]
```

Out[15]=



Second approach

In[16]:=

```
l[0] = {Line[{{0, 0}, {1, 1}}]};
l[n_] := l[n] =
  Flatten[l[n - 1] /. Line[{a_, b_}] -> {Line[{a, {a[[1]] + 1 / 3^n, a[[2]] + 1 / 2^n}}],
      Line[{{a[[1]] + 2 / 3^n, a[[2]] + 1 / 2^n}, b}]}]
Manipulate[Show[Graphics[{Blue, Thick, l[n]}], AxesLabel →
   {Row[{Subscript["C", n]}], "[0,1]"}, PlotRange → {0, 1},
  PlotRangePadding → {0.1}, BaseStyle → {16, Bold}, ImageSize → 500, Axes → True,
  Ticks → {Table[k / 9, {k, 0, 9}], Table[k / 8, {k, 0, 8}]}], {n, 0, 8, 1}]
```

Out[18]=