

Hanoi Towers

Vasiliki Lontou
12/6/2017

```
(* I tried to make a graphic representation of the Hanoi Towers. Initially,
I wanted to color each disk with a different color that would be
related to its dimentions so it would not change through the process
but I could not find a way to do it. Do you have any suggestions?*)

H[1] := {1}
H[n_] := H[n] = Join[H[n - 1], {n}, H[n - 1]]

hanoi[1, i_, j_] := {{i, j}}
hanoi[n_, i_, j_] := Join[hanoi[n - 1, i, 6 - i - j], {{i, j}}, hanoi[n - 1, 6 - i - j, j]]

disp[t_, {i_, j_}] := Module[{q = t, d},
  d = First[q[[i]];
  q[[i]] = Rest[q[[i]];
  q[[j]] = Prepend[q[[j]], d];
  q]

towers[n_] := FoldList[disp, {Range[n], {}, {}}, hanoi[n, 1, 3]]

h[n_, Li_] := Module[{y = -0.5},
  {Map[{y = y + 0.5; Rectangle[{-#, y}, {#, y + 0.5}]} &, Reverse[Li]]}]

shift[g_, x_] := g /. Rectangle[r__] :> Rectangle @@ Transpose[Transpose[{r}] + {x, 0}]

Towers[{a_, b_, c_}] := Module[{n = Length[Flatten[{a, b, c}]}], Graphics[{h[n, a],
  RGBColor[1, 0, 0], shift[h[n, b], 2 n],
  RGBColor[1, 2, 0], shift[h[n, c], 4 n]},
  AspectRatio -> Automatic, PlotRange -> {{-n - .5, 5 n + 1}, {-1, n}}]
]
```

```
Show[GraphicsGrid[Transpose[Partition[movie = Towers /@ towers[5], 10]],  
ImageSize -> 500]
```

