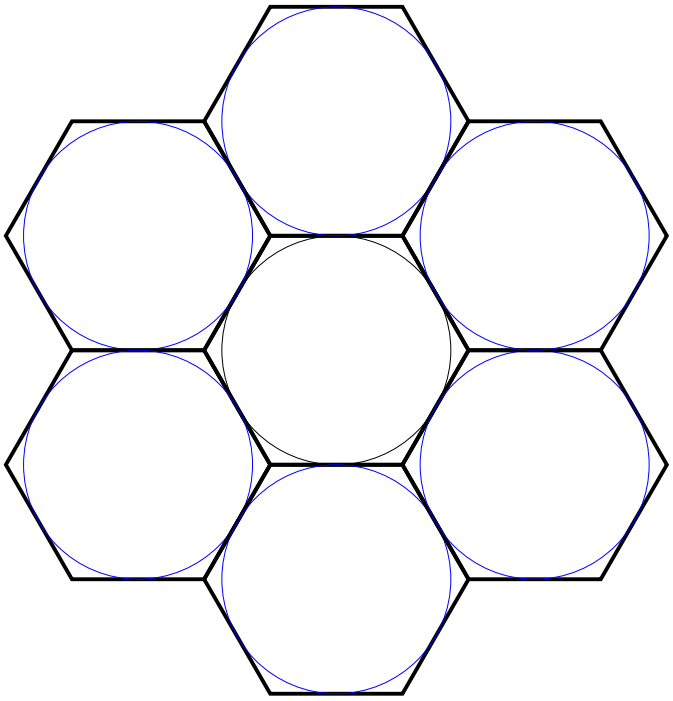
Previous Circle Inversion of circle inscribed in a Honeycomb lattice
https://www.youtube.com/watch?v=1DeYvCq9wQM
http://www1.lasalle.edu/~blum/c152wks/Honeycomb_Circle_Inversion.pdf

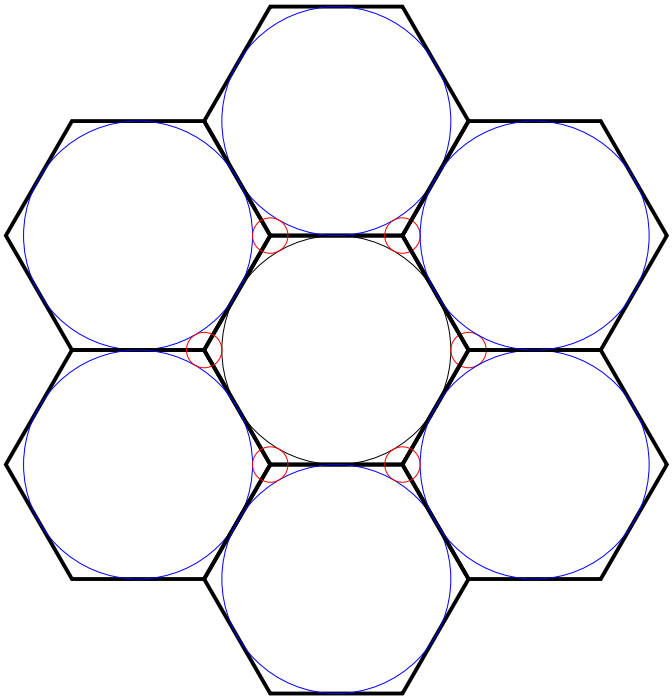
In[1]:=
```
HC = {};
center = Graphics[{EdgeForm[Thick], Opacity[0], RegularPolygon[{0, 0}, 2 / Sqrt[3], 6]}];
AppendTo[HC, center];
center = Graphics[Circle[{0, 0}, 1]] ;
AppendTo[HC, center];
For[i = 0, i < 6, i++,
(* NN - nearest neighbors *)
NN = Graphics[{EdgeForm[Thick], Opacity[0],
RegularPolygon[{2 * Cos[Pi / 2 + i * Pi / 3], 2 * Sin[Pi / 2 + i * Pi / 3]}, 2 / Sqrt[3], 6]}];
AppendTo[HC, NN];
NN = Graphics[{Blue, Circle[{2 * Cos[Pi / 2 + i * Pi / 3], 2 * Sin[Pi / 2 + i * Pi / 3]}, 1]}];
AppendTo[HC, NN];
]; Show[HC]
```

Out[6]=



In[7]:=
```
HC = {};
center = Graphics[{EdgeForm[Thick], Opacity[0], RegularPolygon[{0, 0}, 2 / Sqrt[3], 6]}];
AppendTo[HC, center];
center = Graphics[Circle[{0, 0}, 1]] ;
AppendTo[HC, center];
For[i = 0, i < 6, i++,
(* NN - nearest neighbors *)
NN = Graphics[{EdgeForm[Thick], Opacity[0],
RegularPolygon[{2 * Cos[Pi / 2 + i * Pi / 3], 2 * Sin[Pi / 2 + i * Pi / 3]}, 2 / Sqrt[3], 6]}];
AppendTo[HC, NN];
NN = Graphics[{Blue, Circle[{2 * Cos[Pi / 2 + i * Pi / 3], 2 * Sin[Pi / 2 + i * Pi / 3]}, 1]}];
AppendTo[HC, NN];
LC = Graphics[{Red, Circle[{2 / Sqrt[3] * Cos[Pi * i / 3], 2 / Sqrt[3] * Sin[Pi * i / 3]}, 2 / Sqrt[3] - 1]}];
AppendTo[HC, LC]
]; Show[HC]
```

Out[12]=



In[13]:=
```
FarPoint = Simplify[1 + 2 * (2 / Sqrt[3] - 1)]
```

Out[13]=

$$-1 + \frac{4}{\sqrt{3}}$$

In[14]:=
```
CP = FullSimplify[1 / FarPoint]
```

Out[14]=

$$\frac{1}{13}\left(3 + 4\ \sqrt{3}\right)$$

In[15]:=
```
newRad = FullSimplify[(1 - CP) / 2]
```

Out[15]=

$$\frac{1}{13}\left(5 - 2\ \sqrt{3}\right)$$

In[16]:=
```
N[newRad]
```

Out[16]=

```
0.118146
```

In[17]:=
```
IHC = {}; (* inverted honeycomb*)
center = Graphics[{EdgeForm[Thick], Opacity[0], RegularPolygon[{0, 0}, 2 / Sqrt[3], 6]}];
AppendTo[IHC, center];
center = Graphics[Circle[{0, 0}, 1]] ;
AppendTo[IHC, center];
For[i = 0, i < 6, i++,
(* inverted nearest neighbor circles radii 1/3 *)
NN = Graphics[
   {Blue, Circle[{2 / 3 * Cos[Pi / 2 + i * Pi / 3], 2 / 3 * Sin[Pi / 2 + i * Pi / 3]}, 1 / 3]}];
AppendTo[IHC, NN];
LC = Graphics[{Red, Circle[
      {(8 + 2 * Sqrt[3]) / 13 * Cos[Pi * i / 3], (8 + 2 * Sqrt[3]) / 13 * Sin[Pi * i / 3]}, (5 - 2 * Sqrt[3]) / 13]}];
AppendTo[IHC, LC]
]; Show[IHC]
```

Out[22]=