Program where we try to see if we can write run time T as some constant t times the S_ {sigma_K} value .

In[•]:=
```
<< KnotTheory`
```

Get: StringDrop[File, −14] in $Path is not a string.

ToFileName: String or list of strings expected at position 1 in ToFileName[StringDrop[File, −14], KnotTheory].

FileInformation: The specified argument ToFileName[StringDrop[File, −14], KnotTheory] should be a valid string or File.

```
Loading KnotTheory` version of February 2, 2020, 10:53:45.2097.
Read more at http://katlas.org/wiki/KnotTheory.
```

In[•]:=
```
Ks = ReadList["http://drorbn.net/AcademicPensieve/People/Dunfield/nmd_random_knots"]
```

Out[•]=
```
{PD[X[3, 1, 4, 0], X[5, 3, 0, 2], X[1, 5, 2, 4]], ··· 996 ···,
 PD[X[555, 537, 556, 536], X[1662, 1693, 1663, 1694], X[422, 426, 423, 425],
  X[1962, 1888, 1963, 1887], X[760, 338, 761, 337], X[331, 790, 332, 791],
  X[783, 775, 784, 774], X[723, 709, 724, 708], X[1728, 1570, 1729, 1569],
  X[1047, 1031, 1048, 1030], X[175, 199, 176, 198], X[62, 66, 63, 65],
  X[962, 926, 963, 925], X[1150, 1155, 1151, 1156], X[611, 628, 612, 629], ··· 970 ···,
  X[1849, 1795, 1850, 1794], X[820, 1346, 821, 1345], X[596, 592, 597, 591],
  X[1174, 1129, 1175, 1130], X[1154, 1181, 1155, 1182], X[1489, 1505, 1490, 1504],
  X[1478, 1452, 1479, 1451], X[1453, 1702, 1454, 1703], X[956, 959, 957, 960],
  X[1429, 478, 1430, 479], X[1257, 1255, 1258, 1254], X[814, 1294, 815, 1293],
  X[1699, 1484, 1700, 1485], X[1156, 1133, 1157, 1134], X[1444, 486, 1445, 485]]}
```

large output | show less | show more | show all | set size limit...

In[•]:=
```
Protect[factor, tries];
```

In[•]:=
```
Options[bestGreedy] = {factor → maxWidthPresentationList, tries → 1000};
```

In[•]:=
```
bestGreedy[pd_PD, opts : OptionsPattern[bestGreedy]] :=
 SortBy[Table[greedyRep[pd], {i, OptionValue[tries]}], OptionValue[factor][#] &][[1]]
```

In[•]:=
```
widthPresentationList[crossings_] := widthPresentationList[crossings] =
  Length /@ FoldList[Complement [#1 ⋃ #2, #1 ⋂ #2] &, {}, List @@@ crossings]
```

In[•]:=
```
JonesResult[pdList_] := Module[{widths, JonesQuantity},
  widths = Delete[Delete[widthPresentationList[pdList], 1], -1];
  JonesQuantity =
   Total[Range[Length[widths]] * widths * (CatalanNumber[# / 2] & /@ widths)];
  JonesQuantity]
```

In[•]:=
```
greedyKs = bestGreedy[#] & /@ Ks[[1 ;; 70]];
```

In[•]:=
```
JonesResultIndex  = JonesResult[#] & /@ greedyKs;
```

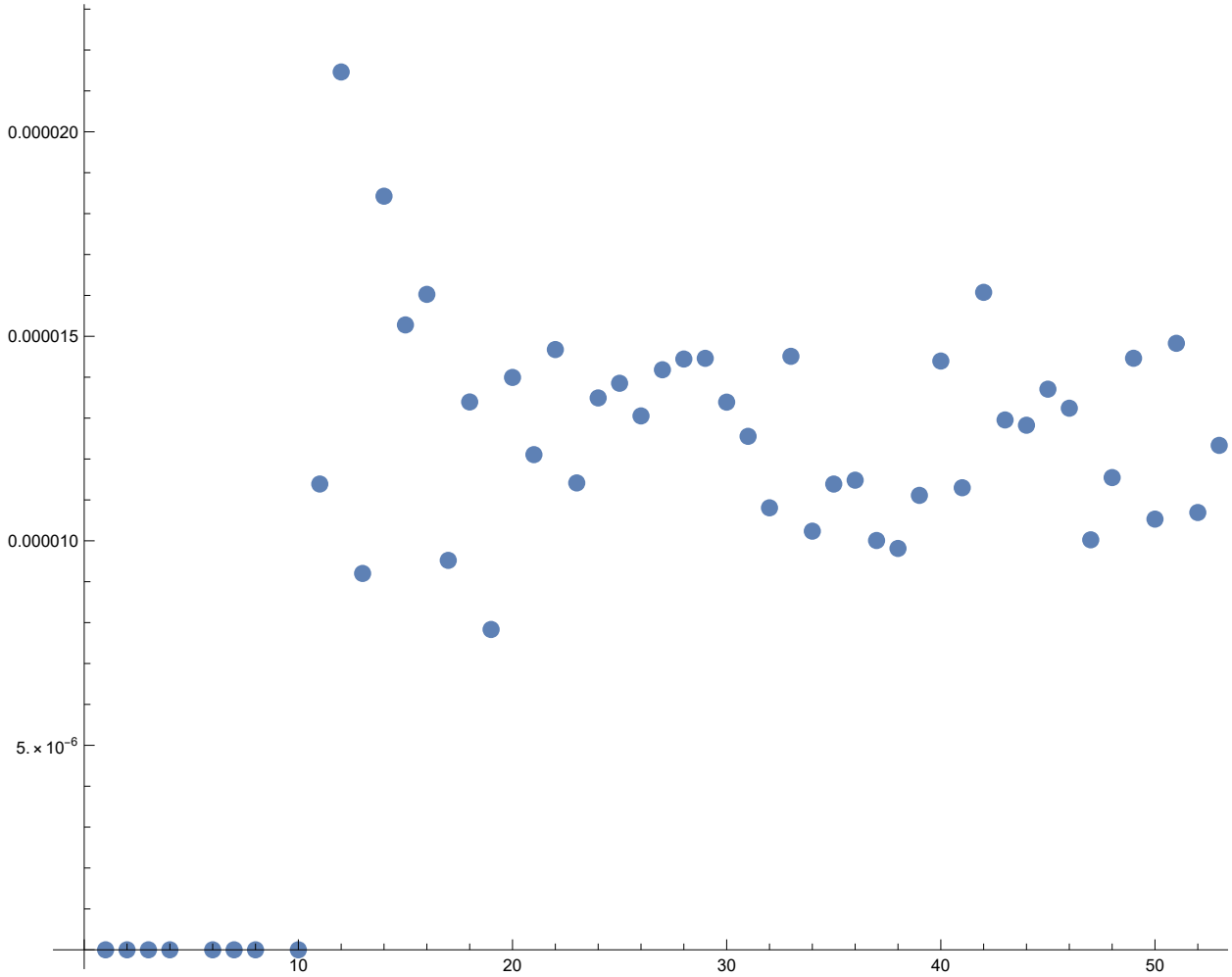
In[•]:=
```
JonesResultIndex[[15]]
```

Out[•]=
```
3068
```

```
In[•]:= FKB[pdList_] := Module[{p, t1, t2, t3, t4, B, d, KB, todo},
          SetAttributes[p, Orderless];
          KB = 1;
          todo = pdList;
          While[Length[todo] > 0,
           x = First[todo];
           todo = DeleteCases[todo, x];
           t1 = KB (x /. X[i_, j_, k_, l_] → A * p[i, j] * p[k, l] + B * p[i, l] * p[j, k]);
           t2 = Expand[t1];
           t3 = t2 //. {p[i_, j_] * p[j_, k_] → p[i, k]};
           t4 = t3 /. {p[i_, i_] → d, p[i_, j_]^2 → d};
           KB = Expand[t4 /. {B → 1 / A, d → -A^2 - 1 / A^2}];
          ];
          KB
         ]

In[•]:= FKBRunTime = (Timing @ FKB[#])[[1]] & /@ greedyKs;

In[•]:= FKBRunTime[[15]]

Out[•]= 0.046875

In[•]:= Ratio = FKBRunTime / JonesResultIndex;
```

In[•]:=
```
ListPlot[Ratio]
```

Out[•]=



- So we conclude that it is sort of where we are looking for with RunTime = 0.000013 * Summation

In[•]:=
```
RunTimeConstant = 0.000013;
```