

Pensieve header: Counting classical braids.

```
(Alt) In[ ]:= SetDirectory["C:\\drorbn\\AcademicPensieve\\Projects\\OU";  
<< "OU-Programs.m"
```

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

2

```
(Alt) In[ ]:= Timing@CountBs [2, 0]
```

```
(Alt) Out[ ]:= {0., 1}
```

```
(Alt) In[ ]:= Timing@CountBs [2, 1]
```

```
(Alt) Out[ ]:= {0., 3}
```

```
(Alt) In[ ]:= Timing@CountBs [2, 2]
```

```
(Alt) Out[ ]:= {0., 5}
```

```
(Alt) In[ ]:= Timing@CountBs [2, 3]
```

```
(Alt) Out[ ]:= {0., 7}
```

3

```
(Alt) In[ ]:= Timing@CountBs [3, 0]
```

```
(Alt) Out[ ]:= {0., 1}
```

```
(Alt) In[ ]:= Timing@CountBs [3, 1]
```

```
(Alt) Out[ ]:= {0., 5}
```

```
(Alt) In[ ]:= Timing@CountBs [3, 2]
```

```
(Alt) Out[ ]:= {0.015625, 17}
```

```
(Alt) In[ ]:= Timing@CountBs [3, 3]
```

```
(Alt) Out[ ]:= {0.046875, 47}
```

```
(Alt) In[ ]:= Timing@CountBs [3, 4]
```

```
(Alt) Out[ ]:= {0.203125, 115}
```

```
(Alt) In[ ]:= Timing@CountBs [3, 5]
```

```
(Alt) Out[ ]:= {1.07813, 263}
```

```
(Alt) In[ ]:= Timing@CountBs [3, 6]
```

```
(Alt) Out[ ]:= {4.89063, 577}
```

(Alt) In[]:= **Timing@CountBs [3, 7]**

(Alt) Out[]:= {27.9219, 1233}

(Alt) In[]:= **Timing@CountBs [3, 8]**

(Alt) Out[]:= {155.781, 2589}

(Alt) In[]:= **Timing@CountBs [3, 9]**

(Alt) Out[]:= {901.359, 5371}

(Alt) In[]:= **Timing@CountBs [3, 10]**

(Alt) Out[]:= {5687.67, 11047}

(Alt) In[]:= **Timing@CountBs [3, 11]**

(Alt) Out[]:= {36763.5, 22579}

(Alt) In[]:= **Timing@CountBs [3, 12]**

(Alt) Out[]:= {253568., 45933}

(Alt) In[]:= **f3[m] =**

FullSimplify[m // FindSequenceFunction@{1, 5, 17, 47, 115, 263, 577, 1233, 2589, 5371}]

(Alt) Out[]:= $1 + 3 \times 2^{1+m} + \left(-3 - \frac{7}{\sqrt{5}}\right) \left(\frac{1}{2} (1 + \sqrt{5})\right)^m + \frac{1}{5} \left(\frac{1}{2} (-1 + \sqrt{5})\right)^m (-15 + 7\sqrt{5}) e^{i m \pi} - 2 m$

(Alt) In[]:= **Expand[f3[m] /. m → 11]**

(Alt) Out[]:= 11047

(Alt) In[]:= **Expand[f3[m] /. m → 12]**

(Alt) Out[]:= 22579

(Alt) In[]:= **Table[12 × 2^m - 2 Fibonacci[m + 5] - 2 m - 1, {m, 0, 12}]**

(Alt) Out[]:= {1, 5, 17, 47, 115, 263, 577, 1233, 2589, 5371, 11047, 22579, 45933}

(Alt) In[]:= **Table[12 × 2^m - 2 Fibonacci[m + 5] - 2 m - 1, {m, 0, 15}] // FindLinearRecurrence**

(Alt) Out[]:= {5, -8, 3, 3, -2}

(Alt) In[]:= **FindGeneratingFunction[Table[12 × 2^m - 2 Fibonacci[m + 5] - 2 m - 1, {m, 0, 15}], x] // Factor**

(Alt) Out[]:=
$$-\frac{(1+x)(-1+x-x^2+2x^3)}{(-1+x)^2(-1+2x)(-1+x+x^2)}$$

4

(Alt) In[]:= **Timing@CountBs [4, 0]**

(Alt) Out[]:= {0., 1}

(Alt) In[*]:= **Timing@CountBs [4, 1]**

(Alt) Out[*]:= {0., 7}

(Alt) In[*]:= **Timing@CountBs [4, 2]**

(Alt) Out[*]:= {0.03125, 33}

(Alt) In[*]:= **Timing@CountBs [4, 3]**

(Alt) Out[*]:= {0.109375, 131}

(Alt) In[*]:= **Timing@CountBs [4, 4]**

(Alt) Out[*]:= {0.5, 469}

(Alt) In[*]:= **Timing@CountBs [4, 5]**

(Alt) Out[*]:= {5.21875, 1579}

(Alt) In[*]:= **Timing@CountBs [4, 6]**

(Alt) Out[*]:= {36.4375, 5121}

(Alt) In[*]:= **Timing@CountBs [4, 7]**

(Alt) Out[*]:= {284.844, 16 219}

(Alt) In[*]:= **Timing@CountBs [4, 8]**

(Alt) Out[*]:= {3601.2, 50 581}

(Alt) In[*]:= **Timing@CountBs [4, 9]**

(Alt) Out[*]:= {21 730.2, 156 127}

5

(Alt) In[*]:= **Timing@CountBs [5, 0]**

(Alt) Out[*]:= {0., 1}

(Alt) In[*]:= **Timing@CountBs [5, 1]**

(Alt) Out[*]:= {0., 9}

(Alt) In[*]:= **Timing@CountBs [5, 2]**

(Alt) Out[*]:= {0.03125, 53}

(Alt) In[*]:= **Timing@CountBs [5, 3]**

(Alt) Out[*]:= {0.15625, 259}

(Alt) In[*]:= **Timing@CountBs [5, 4]**

(Alt) Out[*]:= {1.35938, 1143}

(Alt) In[*]:= **Timing@CountBs [5, 5]**

(Alt) Out[*]:= {11.8281, 4743}

(Alt) In[*]:= **Timing@CountBs [5, 6]**

(Alt) Out[*]:= {111.109, 18 941}

(Alt) In[*]:= **Timing@CountBs [5, 7]**

(Alt) Out[*]:= {1546.03, 73 817}

(Alt) In[*]:= **Timing@CountBs [5, 8]**

(Alt) Out[*]:= {9350.73, 283 165}

(Alt) In[*]:= **Timing@CountBs [5, 9]**

(Alt) Out[*]:= {72 404.5, 1 074 963}

6

(Alt) In[*]:= **Timing@CountBs [6, 0]**

(Alt) Out[*]:= {0., 1}

(Alt) In[*]:= **Timing@CountBs [6, 1]**

(Alt) Out[*]:= {0., 11}

(Alt) In[*]:= **Timing@CountBs [6, 2]**

(Alt) Out[*]:= {0.015625, 77}

(Alt) In[*]:= **Timing@CountBs [6, 3]**

(Alt) Out[*]:= {0.34375, 439}

(Alt) In[*]:= **Timing@CountBs [6, 4]**

(Alt) Out[*]:= {3.09375, 2233}

(Alt) In[*]:= **Timing@CountBs [6, 5]**

(Alt) Out[*]:= {28.0938, 10 603}

(Alt) In[*]:= **Timing@CountBs [6, 6]**

(Alt) Out[*]:= {375.469, 48 209}

(Alt) In[*]:= **Timing@CountBs [6, 7]**

(Alt) Out[*]:= {2419.14, 213 119}

(Alt) In[*]:= **Timing@CountBs [6, 8]**

(Alt) Out[*]:= {21 731.1, 924 865}

(Alt) In[*]:= **Timing@CountBs [6, 9]**

(Alt) Out[*]:= {196 519., 3 964 411}

7

(Alt) In[*]:= **Timing@CountBs [7, 0]**

(Alt) Out[*]:= {0., 1}

(Alt) In[*]:= **Timing@CountBs [7, 1]**

(Alt) Out[*]:= {0., 13}

(Alt) In[*]:= **Timing@CountBs [7, 2]**

(Alt) Out[*]:= {0.015625, 105}

(Alt) In[*]:= **Timing@CountBs [7, 3]**

(Alt) Out[*]:= {0.484375, 679}

(Alt) In[*]:= **Timing@CountBs [7, 4]**

(Alt) Out[*]:= {4.65625, 3867}

(Alt) In[*]:= **Timing@CountBs [7, 5]**

(Alt) Out[*]:= {44.8281, 20 351}

(Alt) In[*]:= **Timing@CountBs [7, 6]**

(Alt) Out[*]:= {534.875, 101 765}

(Alt) In[*]:= **Timing@CountBs [7, 7]**

(Alt) Out[*]:= {5441.44, 491 893}

(Alt) In[*]:= **Timing@CountBs [7, 8]**

(Alt) Out[*]:= {60 274.8, 2 323 785}

8

(Alt) In[*]:= **Timing@CountBs [8, 0]**

(Alt) Out[*]:= {0., 1}

(Alt) In[*]:= **Timing@CountBs [8, 1]**

(Alt) Out[*]:= {0., 15}

(Alt) In[*]:= **Timing@CountBs [8, 2]**

(Alt) Out[*]:= {0.0625, 137}

(Alt) In[*]:= **Timing@CountBs [8, 3]**

(Alt) Out[*]:= {0.71875, 987}

(Alt) In[*]:= **Timing@CountBs [8, 4]**

(Alt) Out[*]:= {7.96875, 6189}

(Alt) In[*]:= **Timing@CountBs [8, 5]**

(Alt) Out[*]:= {81.4531, 35 515}

(Alt) In[*]:= **Timing@CountBs [8, 6]**

(Alt) Out[*]:= {1114.48, 192 081}

(Alt) In[*]:= **Timing@CountBs [8, 7]**

(Alt) Out[*]:= {7451.81, 997 547}

9

(Alt) In[*]:= **Timing@CountBs [9, 0]**

(Alt) Out[*]:= {0.015625, 1}

(Alt) In[*]:= **Timing@CountBs [9, 1]**

(Alt) Out[*]:= {0., 17}

(Alt) In[*]:= **Timing@CountBs [9, 2]**

(Alt) Out[*]:= {0.125, 173}

(Alt) In[*]:= **Timing@CountBs [9, 3]**

(Alt) Out[*]:= {1.3125, 1371}

(Alt) In[*]:= **Timing@CountBs [9, 4]**

(Alt) Out[*]:= {13.6875, 9359}

(Alt) In[*]:= **Timing@CountBs [9, 5]**

(Alt) Out[*]:= {175.094, 57 959}

(Alt) In[*]:= **Timing@CountBs [9, 6]**

(Alt) Out[*]:= {1388.78, 335 773}

(Alt) In[*]:= **Timing@CountBs [9, 7]**

(Alt) Out[*]:= {12 015.6, 1 855 937}

n

(Alt) In[*]:= **Expand [n - 1 // FindSequenceFunction[{5, 17, 33, 53, 77}]**

(Alt) Out[*]:= $-7 + 2 n + 2 n^2$

(Alt) In[]:= **Expand**[**n - 2 // FindSequenceFunction**[{**47, 131, 259, 439, 679, 987, 1371**}]]

(Alt) Out[]:=
$$-21 - \frac{22n}{3} + 6n^2 + \frac{4n^3}{3}$$

(Alt) In[]:=
$$-21 - \frac{22n}{3} + 6n^2 + \frac{4n^3}{3} /. n \rightarrow 3$$

(Alt) Out[]:= 47