```
SetDirectory["C:\\drorbn\\AcademicPensieve\\2012-07"];
<< FreeLie-120702.m
```

```
BCH[8]
```

$\text{LieSeries}\Big[\langle x\rangle + \langle y\rangle,\ \dfrac{\langle xy\rangle}{2},\ \dfrac{\langle xxy\rangle}{12} + \dfrac{\langle xyy\rangle}{12},\ \dfrac{\langle xxyy\rangle}{24},$

$-\dfrac{\langle xxxxy\rangle}{720} + \dfrac{\langle xxxyy\rangle}{180} + \dfrac{\langle xxyxy\rangle}{360} + \dfrac{\langle xxyyy\rangle}{180} + \dfrac{\langle xyxyy\rangle}{120} - \dfrac{\langle xyyyy\rangle}{720},$

$-\dfrac{\langle xxxxyy\rangle}{1440} + \dfrac{\langle xxxyxy\rangle}{720} + \dfrac{\langle xxxyyy\rangle}{360} + \dfrac{\langle xxyxyy\rangle}{240} - \dfrac{\langle xxyyyy\rangle}{1440},$

$\dfrac{\langle xxxxxxy\rangle}{30\,240} - \dfrac{\langle xxxxxyy\rangle}{5040} + \dfrac{\langle xxxxyxy\rangle}{10\,080} + \dfrac{\langle xxxxyyy\rangle}{3780} + \dfrac{\langle xxxyxxy\rangle}{10\,080} + \dfrac{\langle xxxyxyy\rangle}{1680} +$

$\dfrac{\langle xxxyyxy\rangle}{1260} + \dfrac{\langle xxxyyyy\rangle}{3780} + \dfrac{\langle xxyxxyy\rangle}{2016} - \dfrac{\langle xxyxyxy\rangle}{5040} + \dfrac{13\,\langle xxyxyyy\rangle}{15\,120} + \dfrac{\langle xxyyxyy\rangle}{10\,080} -$

$\dfrac{\langle xxyyyxy\rangle}{1512} - \dfrac{\langle xxyyyyy\rangle}{5040} + \dfrac{\langle xyxyxyy\rangle}{1260} - \dfrac{\langle xyxyyyy\rangle}{2016} - \dfrac{\langle xyyxyyy\rangle}{5040} + \dfrac{\langle xyyyyyy\rangle}{30\,240},$

$\dfrac{\langle xxxxxxyy\rangle}{60\,480} - \dfrac{\langle xxxxxyxy\rangle}{15\,120} - \dfrac{\langle xxxxxyyy\rangle}{10\,080} + \dfrac{\langle xxxxyxxy\rangle}{20\,160} - \dfrac{\langle xxxxyxyy\rangle}{20\,160} + \dfrac{\langle xxxxyyxy\rangle}{2520} +$

$\dfrac{23\,\langle xxxxyyyy\rangle}{120\,960} + \dfrac{\langle xxxyxxyy\rangle}{4032} - \dfrac{\langle xxxyxyxy\rangle}{10\,080} + \dfrac{13\,\langle xxxyxyyy\rangle}{30\,240} + \dfrac{\langle xxxyyxyy\rangle}{20\,160} -$

$\dfrac{\langle xxxyyyxy\rangle}{3024} - \dfrac{\langle xxxyyyyy\rangle}{10\,080} + \dfrac{\langle xxyxyxyy\rangle}{2520} - \dfrac{\langle xxyxyyyy\rangle}{4032} - \dfrac{\langle xxyyxyyy\rangle}{10\,080} + \dfrac{\langle xxyyyyyy\rangle}{60\,480}\Big]$

```
Do[
 BCH[n];
 Print[n → {TimeUsed[], Length[BCH[n] // Last]}],
 {n, 20}
]
```

$1 \to \{0.421, 2\}$

$2 \to \{0.421, 2\}$

$3 \to \{0.421, 2\}$

$4 \to \{0.421, 2\}$

$5 \to \{0.421, 6\}$

$6 \to \{0.421, 5\}$

$7 \to \{0.421, 18\}$

$8 \to \{0.421, 17\}$

$9 \to \{0.639, 55\}$

$10 \to \{0.998, 55\}$

$11 \to \{1.809, 186\}$

$12 \to \{3.619, 185\}$

$13 \to \{7.784, 630\}$

$14 \to \{17.44, 629\}$

$15 \to \{40.591, 2181\}$

$16 \to \{97.219, 2181\}$

$17 \to \{233.299, 7710\}$

$18 \to \{576.626, 7709\}$

$19 \to \{1564.58, 27594\}$

$20 \to \{4340.2, 27593\}$

**Length /@ BCH[20]**

LieSeries[2, 2, 2, 2, 6, 5, 18, 17, 55, 55,
 186, 185, 630, 629, 2181, 2181, 7710, 7709, 27594, 27593]

**BCH[20] >> "BCH20.m"**