

Generating function for the number of perfect matchings in $C_{16} \times P_n$ graph

```
> Gf := (1+x) *  
  (1-46*x-  
  9119*x^2+  
  196040*x^3+  
  22261537*x^4-  
  212104078*x^5-  
  20617331327*x^6+  
  113812961408*x^7+  
  9289004966785*x^8-  
  39816493450126*x^9-  
  2305143860230367*x^10+  
  9425903722149320*x^11+  
  335408260964459617*x^12-  
  1433002865743042606*x^13-  
  29692552742120471039*x^14+  
  136336960834469715968*x^15+  
  1637884321061048187388*x^16-  
  8115483992530009499464*x^17-  
  57403122882162226002308*x^18+  
  306611992048248166453472*x^19+  
  1309414384165875057273724*x^20-  
  7559206519242044876235208*x^21-  
  19932922389675751484922884*x^22+  
  125356011272206209147067904*x^23+  
  206789433140821404419790844*x^24-  
  1435227630206122555223769544*x^25-  
  1483964987384561791734318212*x^26+  
  11574658463183577892507164896*x^27+  
  7427374161534206801646712444*x^28-  
  66703717482842684704669202248*x^29-  
  25957266955337069684733710852*x^30+  
  277367254850357385109005836288*x^31+  
  62860484572251821683998642694*x^32-  
  837258409814205741118312794388*x^33-  
  102996363503374053531529379258*x^34+  
  1840920720933802995369376062128*x^35+  
  105907012394168142224151782086*x^36-  
  2952835383495386902240591488340*x^37-  
  45935141123368492175794822394*x^38+  
  3456529902053052485410968326912*x^39-  
  45935141123368492175794822394*x^40-  
  2952835383495386902240591488340*x^41+  
  105907012394168142224151782086*x^42+  
  1840920720933802995369376062128*x^43-  
  102996363503374053531529379258*x^44-
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$$\begin{aligned}
& 837258409814205741118312794388*x^{45}+ \\
& 62860484572251821683998642694*x^{46}+ \\
& 277367254850357385109005836288*x^{47}- \\
& 25957266955337069684733710852*x^{48}- \\
& 66703717482842684704669202248*x^{49}+ \\
& 7427374161534206801646712444*x^{50}+ \\
& 11574658463183577892507164896*x^{51}- \\
& 1483964987384561791734318212*x^{52}- \\
& 1435227630206122555223769544*x^{53}+ \\
& 206789433140821404419790844*x^{54}+ \\
& 125356011272206209147067904*x^{55}- \\
& 19932922389675751484922884*x^{56}- \\
& 7559206519242044876235208*x^{57}+ \\
& 1309414384165875057273724*x^{58}+ \\
& 306611992048248166453472*x^{59}- \\
& 57403122882162226002308*x^{60}- \\
& 8115483992530009499464*x^{61}+ \\
& 1637884321061048187388*x^{62}+ \\
& 136336960834469715968*x^{63}- \\
& 29692552742120471039*x^{64}- \\
& 1433002865743042606*x^{65}+ \\
& 335408260964459617*x^{66}+ \\
& 9425903722149320*x^{67}- \\
& 2305143860230367*x^{68}- \\
& 39816493450126*x^{69}+ \\
& 9289004966785*x^{70}+ \\
& 113812961408*x^{71}- \\
& 20617331327*x^{72}- \\
& 212104078*x^{73}+ \\
& 22261537*x^{74}+ \\
& 196040*x^{75}- \\
& 9119*x^{76}- \\
& 46*x^{77}+ \\
& x^{78}) / \\
& (1-x) / \\
& (1+16*x+ \\
& 96*x^2+ \\
& 272*x^3+ \\
& 384*x^4+ \\
& 272*x^5+ \\
& 96*x^6+ \\
& 16*x^7+ \\
& x^8) / \\
& (1-28*x+ \\
& 262*x^2- \\
& 988*x^3+ \\
& 1538*x^4-
\end{aligned}$$

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988*x^5+
262*x^6-
28*x^7+
x^8) /
(1-64*x+
1540*x^2-
18496*x^3+
126984*x^4-
538048*x^5+
1472012*x^6-
2668992*x^7+
3250190*x^8-
2668992*x^9+
1472012*x^10-
538048*x^11+
126984*x^12-
18496*x^13+
1540*x^14-
64*x^15+
x^16) /
(1-194*x+
11392*x^2-
260542*x^3+
2921984*x^4-
18115138*x^5+
65660800*x^6-
142138174*x^7+
184101886*x^8-
142138174*x^9+
65660800*x^10-
18115138*x^11+
2921984*x^12-
260542*x^13+
11392*x^14-
194*x^15+
x^16) /
(1+224*x+
20800*x^2+
1078464*x^3+
35287040*x^4+
778285248*x^5+
12053087552*x^6+
134780738784*x^7+
1111345175556*x^8+
6874255892128*x^9+
32373869127616*x^10+
117578706213440*x^11+

```

```
332912913174528*x^12+
741331660412480*x^13+
1307074869550016*x^14+
1833399140711072*x^15+
2051668475852806*x^16+
1833399140711072*x^17+
1307074869550016*x^18+
741331660412480*x^19+
332912913174528*x^20+
117578706213440*x^21+
32373869127616*x^22+
6874255892128*x^23+
1111345175556*x^24+
134780738784*x^25+
12053087552*x^26+
778285248*x^27+
35287040*x^28+
1078464*x^29+
20800*x^30+
224*x^31+
x^32) :
```

```
> series(Gf,x,7);
```

```
1 + 2 x + 2209 x2 + 75272 x3 + 18241441 x4 + 1227006722 x5 + 188926707649 x6 + O(x7)
```