Generating functions for homeomorphically irreducible multigraphs (or multigraphs without nodes of degree 2) on n labeled nodes, n=2,…,10

$$-\frac{x^3 - x^2 + 1}{x - 1}$$

$$\frac{3x^7 - 7x^6 + 6x^5 + 3x^4 - 11x^3 + 6x^2 - 1}{(x-1)^3}$$

$$-\frac{4x^{12} - 12x^{11} + 6x^{10} + 50x^9 - 180x^8 + 282x^7 - 208x^6 + 30x^5 + 72x^4 - 62x^3 + 18x^2 - 1}{(x-1)^6}$$

$$(5x^{18} - 20x^{17} + 30x^{16} + 58x^{15} - 745x^{14} + 2790x^{13} - 5270x^{12} + 5010x^{11} - 711x^{10}$$
$$- 4380x^9 + 6270x^8 - 4470x^7 + 1535x^6 + 178x^5 - 450x^4 + 210x^3 - 40x^2 + 1) \Big/$$
$$(x-1)^{10}$$

$$-(6x^{25} - 30x^{24} + 60x^{23} + 615x^{22} - 9280x^{21} + 54909x^{20} - 186150x^{19} + 404285x^{18}$$
$$- 581340x^{17} + 522915x^{16} - 172878x^{15} - 289605x^{14} + 590880x^{13} - 581955x^{12}$$
$$+ 337755x^{11} - 67650x^{10} - 74150x^9 + 84315x^8 - 42870x^7 + 10410x^6 + 888x^5$$
$$- 1590x^4 + 535x^3 - 75x^2 + 1) \Big/ (x-1)^{15}$$

$$(7x^{33} - 42x^{32} + 105x^{31} + 3598x^{30} - 64995x^{29} + 498369x^{28} - 2213029x^{27} + 6169800x^{26}$$
$$- 10213560x^{25} + 4476990x^{24} + 27664014x^{23} - 97812519x^{22} + 197723150x^{21}$$
$$- 296237340x^{20} + 352014180x^{19} - 334492361x^{18} + 243984426x^{17} - 117769575x^{16}$$
$$+ 9628325x^{15} + 45726945x^{14} - 50729175x^{13} + 31353175x^{12} - 11717370x^{11}$$
$$+ 1358280x^{10} + 1395765x^9 - 1068648x^8 + 395328x^7 - 77805x^6 + 882x^5 + 4095x^4$$
$$- 1141x^3 + 126x^2 - 1) \Big/ (x-1)^{21}$$

$$-\left(8\,x^{42} - 56\,x^{41} + 168\,x^{40} + 17164\,x^{39} - 378028\,x^{38} + 3706920\,x^{37} - 21716954\,x^{36}\right.$$
$$+\,83995316\,x^{35} - 220578624\,x^{34} + 377866888\,x^{33} - 332715558\,x^{32} - 137104380\,x^{31}$$
$$+\,710503668\,x^{30} - 219005640\,x^{29} - 2570556330\,x^{28} + 7807702420\,x^{27}$$
$$-\,15308056540\,x^{26} + 27118801920\,x^{25} - 47396634250\,x^{24} + 76710543700\,x^{23}$$
$$-\,106395856560\,x^{22} + 121739352896\,x^{21} - 113185949058\,x^{20} + 84329133588\,x^{19}$$
$$-\,48705827576\,x^{18} + 19640990180\,x^{17} - 2947118118\,x^{16} - 3086075216\,x^{15}$$
$$+\,3330322544\,x^{14} - 1881227628\,x^{13} + 696413886\,x^{12} - 144308416\,x^{11}$$
$$-\,11601576\,x^{10} + 23480380\,x^{9} - 10506370\,x^{8} + 2804028\,x^{7} - 445592\,x^{6} + 20188\,x^{5}$$
$$\left.+\,8568\,x^{4} - 2156\,x^{3} + 196\,x^{2} - 1\right)\Big/(x-1)^{28}$$

$$\left(9\,x^{52} - 72\,x^{51} + 252\,x^{50} + 72432\,x^{49} - 1937502\,x^{48} + 23707908\,x^{47} - 176829660\,x^{46}\right.$$
$$+\,893041604\,x^{45} - 3180368457\,x^{44} + 7867340712\,x^{43} - 11106800052\,x^{42}$$
$$-\,10489790304\,x^{41} + 151631377254\,x^{40} - 760306363656\,x^{39} + 2935916883576\,x^{38}$$
$$-\,9425985286464\,x^{37} + 25348130248546\,x^{36} - 57151056597732\,x^{35}$$
$$+\,108312943417686\,x^{34} - 173062766730756\,x^{33} + 233525501776224\,x^{32}$$
$$-\,265954204234800\,x^{31} + 254746997828838\,x^{30} - 204011895164616\,x^{29}$$
$$+\,136067440059810\,x^{28} - 77168694177960\,x^{27} + 42185590165530\,x^{26}$$
$$-\,29779620995880\,x^{25} + 29003149517448\,x^{24} - 29221328098152\,x^{23}$$
$$+\,25611216879906\,x^{22} - 18734253995892\,x^{21} + 11307975033033\,x^{20}$$
$$-\,5503761707472\,x^{19} + 2010757941850\,x^{18} - 406075259340\,x^{17} - 99111309498\,x^{16}$$
$$+\,146687123268\,x^{15} - 83166390162\,x^{14} + 31316577012\,x^{13} - 7847043729\,x^{12}$$
$$+\,820957032\,x^{11} + 330415110\,x^{10} - 218086936\,x^{9} + 69471738\,x^{8} - 14463144\,x^{7}$$
$$\left.+\,1908438\,x^{6} - 101052\,x^{5} - 15372\,x^{4} + 3732\,x^{3} - 288\,x^{2} + 1\right)\Big/(x-1)^{36}$$

$$
\begin{aligned}
-\,\big(\,&10\,x^{63} - 90\,x^{62} + 360\,x^{61} + 283965\,x^{60} - 9147060\,x^{59} + 137111670\,x^{58} \\
&- 1271525220\,x^{57} + 8130560535\,x^{56} - 37563987474\,x^{55} + 124788556130\,x^{54} \\
&- 253358292420\,x^{53} - 185379774255\,x^{52} + 5242846781970\,x^{51} \\
&- 34718635974204\,x^{50} + 166092113604420\,x^{49} - 639290417689125\,x^{48} \\
&+ 2017743246183420\,x^{47} - 5190952326606720\,x^{46} + 10567413003856796\,x^{45} \\
&- 15468060985377840\,x^{44} + 9412874764277670\,x^{43} + 30474751789587570\,x^{42} \\
&- 138388226475661560\,x^{41} + 347274817306653600\,x^{40} - 665680519689087240\,x^{39} \\
&+ 1056399964363797210\,x^{38} - 1435422346555373820\,x^{37} \\
&+ 1700359816823408580\,x^{36} - 1776061699385661972\,x^{35} \\
&+ 1649349396541935810\,x^{34} - 1370760578452511820\,x^{33} \\
&+ 1024953446681766180\,x^{32} - 691896070744406910\,x^{31} \\
&+ 421710496363525488\,x^{30} - 230775593862699900\,x^{29} + 111809502265638915\,x^{28} \\
&- 46806005183220920\,x^{27} + 16431740721505980\,x^{26} - 4929268716238536\,x^{25} \\
&+ 1763753549335005\,x^{24} - 1244611805519250\,x^{23} + 1086429831855480\,x^{22} \\
&- 787271577275400\,x^{21} + 446992325836479\,x^{20} - 196836361328115\,x^{19} \\
&+ 63717970073215\,x^{18} - 11670937831440\,x^{17} - 1777980210255\,x^{16} \\
&+ 2576294938140\,x^{15} - 1242879297570\,x^{14} + 392365724400\,x^{13} - 82487215680\,x^{12} \\
&+ 7629957450\,x^{11} + 2133582912\,x^{10} - 1224969340\,x^{9} + 327880980\,x^{8} - 57500820\,x^{7} \\
&+ 6527220\,x^{6} - 343944\,x^{5} - 24300\,x^{4} + 6045\,x^{3} - 405\,x^{2} + 1\,\big) \Big/ (x-1)^{45}
\end{aligned}
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