In[•]:= **feasiblecharpolylist[75, (x + 5)^56 (x - 15)^12]**

Out[•]= $\Big\{ (-15 + x) \, (-14 + x) \, (-13 + x)^3 \, \left(251 - 32\,x + x^2\right),$

$(-18 + x) \, (-15 + x)^2 \, (-13 + x)^4, \; (-15 + x)^2 \, (-14 + x) \, (-13 + x)^2 \, \left(217 - 30\,x + x^2\right),$

$(-15 + x) \, (-13 + x)^3 \, \left(-3506 + 699\,x - 46\,x^2 + x^3\right), \; (-17 + x)^2 \, (-14 + x) \, (-13 + x)^4,$

$(-15 + x)^2 \, (-13 + x)^2 \, \left(-3034 + 637\,x - 44\,x^2 + x^3\right),$

$(-15 + x) \, (-13 + x)^2 \, \left(45\,518 - 12\,589\,x + 1297\,x^2 - 59\,x^3 + x^4\right),$

$(-17 + x) \, (-15 + x) \, (-13 + x)^3 \, \left(206 - 29\,x + x^2\right),$

$(-15 + x)^2 \, (-14 + x) \, (-13 + x) \, \left(-2813 + 607\,x - 43\,x^2 + x^3\right),$

$(-15 + x)^3 \, (-13 + x)^2 \, \left(202 - 29\,x + x^2\right),$

$(-17 + x) \, (-15 + x) \, (-14 + x) \, (-13 + x)^2 \, \left(191 - 28\,x + x^2\right),$

$(-15 + x)^3 \, (-13 + x) \, \left(-2622 + 579\,x - 42\,x^2 + x^3\right),$

$(-17 + x) \, (-15 + x)^2 \, (-13 + x)^2 \, \left(178 - 27\,x + x^2\right),$

$(-15 + x)^2 \, (-13 + x) \, \left(206 - 29\,x + x^2\right) \, \left(191 - 28\,x + x^2\right),$

$(-17 + x) \, (-15 + x)^3 \, (-14 + x) \, (-13 + x) \, (-11 + x),$

$(-15 + x)^3 \, \left(34\,042 - 10\,145\,x + 1125\,x^2 - 55\,x^3 + x^4\right),$

$(-15 + x)^2 \, (-13 + x) \, \left(39\,278 - 11\,303\,x + 1209\,x^2 - 57\,x^3 + x^4\right),$

$(-15 + x)^2 \, (-14 + x) \, \left(191 - 28\,x + x^2\right)^2, \; (-15 + x)^3 \, (-13 + x) \, \left(-2614 + 579\,x - 42\,x^2 + x^3\right),$

$(-15 + x)^4 \, (-11 + x) \, \left(206 - 29\,x + x^2\right), \; (-15 + x)^3 \, \left(191 - 28\,x + x^2\right) \, \left(178 - 27\,x + x^2\right),$

$(-15 + x)^3 \, (-14 + x) \, \left(-2423 + 551\,x - 41\,x^2 + x^3\right),$

$(-15 + x)^4 \, (-13 + x) \, \left(174 - 27\,x + x^2\right), \; (-15 + x)^4 \, \left(-2258 + 525\,x - 40\,x^2 + x^3\right),$

$(-15 + x)^4 \, (-14 + x) \, \left(161 - 26\,x + x^2\right), \; (-15 + x)^6 \, (-10 + x) \Big\}$

```
dim19list = {(-15 + x)^13 (-14 + x) (-13 + x)^3 (5 + x)^56 (251 - 32 x + x^2),
    (-18 + x) (-15 + x)^14 (-13 + x)^4 (5 + x)^56, (-15 + x)^14 (-14 + x) (-13 + x)^2 (5 + x)^56
     (217 - 30 x + x^2), (-15 + x)^13 (-13 + x)^3 (5 + x)^56 (-3506 + 699 x - 46 x^2 + x^3),
    (-17 + x)^2 (-15 + x)^12 (-14 + x) (-13 + x)^4 (5 + x)^56,
    (-15 + x)^14 (-13 + x)^2 (5 + x)^56 (-3034 + 637 x - 44 x^2 + x^3),
    (-15 + x)^13 (-13 + x)^2 (5 + x)^56 (45 518 - 12 589 x + 1297 x^2 - 59 x^3 + x^4),
    (-17 + x) (-15 + x)^13 (-13 + x)^3 (5 + x)^56 (206 - 29 x + x^2),
    (-15 + x)^14 (-14 + x) (-13 + x) (5 + x)^56 (-2813 + 607 x - 43 x^2 + x^3),
    (-15 + x)^15 (-13 + x)^2 (5 + x)^56 (202 - 29 x + x^2),
    (-17 + x) (-15 + x)^13 (-14 + x) (-13 + x)^2 (5 + x)^56 (191 - 28 x + x^2),
    (-15 + x)^15 (-13 + x) (5 + x)^56 (-2622 + 579 x - 42 x^2 + x^3),
    (-17 + x) (-15 + x)^14 (-13 + x)^2 (5 + x)^56 (178 - 27 x + x^2),
    (-15 + x)^14 (-13 + x) (5 + x)^56 (206 - 29 x + x^2) (191 - 28 x + x^2),
    (-17 + x) (-15 + x)^15 (-14 + x) (-13 + x) (-11 + x) (5 + x)^56,
    (-15 + x)^15 (5 + x)^56 (34 042 - 10 145 x + 1125 x^2 - 55 x^3 + x^4),
    (-15 + x)^14 (-13 + x) (5 + x)^56 (39 278 - 11 303 x + 1209 x^2 - 57 x^3 + x^4),
    (-15 + x)^14 (-14 + x) (5 + x)^56 (191 - 28 x + x^2)^2,
    (-15 + x)^15 (-13 + x) (5 + x)^56 (-2614 + 579 x - 42 x^2 + x^3),
    (-15 + x)^16 (-11 + x) (5 + x)^56 (206 - 29 x + x^2),
    (-15 + x)^15 (5 + x)^56 (191 - 28 x + x^2) (178 - 27 x + x^2),
    (-15 + x)^15 (-14 + x) (5 + x)^56 (-2423 + 551 x - 41 x^2 + x^3),
    (-15 + x)^16 (-13 + x) (5 + x)^56 (174 - 27 x + x^2),
    (-15 + x)^16 (5 + x)^56 (-2258 + 525 x - 40 x^2 + x^3),
    (-15 + x)^16 (-14 + x) (5 + x)^56 (161 - 26 x + x^2), (-15 + x)^18 (-10 + x) (5 + x)^56};
```

```
Length[dim19list]
```

```
26
```

```
modfilter[dim19list, chiSmod32n75, 32]
```

$$\{(-18 + x) \ (-15 + x)^{14} \ (-13 + x)^4 \ (5 + x)^{56},$$
$$(-17 + x)^2 \ (-15 + x)^{12} \ (-14 + x) \ (-13 + x)^4 \ (5 + x)^{56},$$
$$(-15 + x)^{15} \ (-13 + x)^2 \ (5 + x)^{56} \ (202 - 29 x + x^2),$$
$$(-17 + x) \ (-15 + x)^{14} \ (-13 + x)^2 \ (5 + x)^{56} \ (178 - 27 x + x^2),$$
$$(-15 + x)^{14} \ (-14 + x) \ (5 + x)^{56} \ (191 - 28 x + x^2)^2,$$
$$(-15 + x)^{16} \ (-11 + x) \ (5 + x)^{56} \ (206 - 29 x + x^2),$$
$$(-15 + x)^{16} \ (-13 + x) \ (5 + x)^{56} \ (174 - 27 x + x^2), \ (-15 + x)^{18} \ (-10 + x) \ (5 + x)^{56}\}$$

```
dim19listmod32 = {(-18 + x) (-15 + x)^14 (-13 + x)^4 (5 + x)^56, (-17 + x)^2 (-15 + x)^12
     (-14 + x) (-13 + x)^4 (5 + x)^56, (-15 + x)^15 (-13 + x)^2 (5 + x)^56 (202 - 29 x + x^2),
    (-17 + x) (-15 + x)^14 (-13 + x)^2 (5 + x)^56 (178 - 27 x + x^2), (-15 + x)^14 (-14 + x)
     (5 + x)^56 (191 - 28 x + x^2)^2, (-15 + x)^16 (-11 + x) (5 + x)^56 (206 - 29 x + x^2),
    (-15 + x)^16 (-13 + x) (5 + x)^56 (174 - 27 x + x^2), (-15 + x)^18 (-10 + x) (5 + x)^56};
```

```
Length[dim19listmod32]
```

8

```
chi = (-17 + x)^2 (-15 + x)^12 (-14 + x) (-13 + x)^4 (5 + x)^56
```

$(-17 + x)^2 (-15 + x)^{12} (-14 + x) (-13 + x)^4 (5 + x)^{56}$

```
CoefficientList[feasibleinterlacingpolylist[chi], x]
```

{{30 719, -9474, 1080, -54, 1},
 {30 615, -9466, 1080, -54, 1}, {30 495, -9458, 1080, -54, 1}}

```
A = {{30 719, -9474, 1080, -54, 1},
    {30 615, -9466, 1080, -54, 1}, {30 495, -9458, 1080, -54, 1}};
```

```
A // MatrixForm
```

$$\begin{pmatrix} 30\,719 & -9474 & 1080 & -54 & 1 \\ 30\,615 & -9466 & 1080 & -54 & 1 \\ 30\,495 & -9458 & 1080 & -54 & 1 \end{pmatrix}$$

```
g = CoefficientList[D[chi, x] / mu[chi] // Factor, x]
```

{2 298 045, -710 142, 81 000, -4050, 75}

```
Array[c, 5].Transpose[A]
```

{30 719 c[1] - 9474 c[2] + 1080 c[3] - 54 c[4] + c[5],
 30 615 c[1] - 9466 c[2] + 1080 c[3] - 54 c[4] + c[5],
 30 495 c[1] - 9458 c[2] + 1080 c[3] - 54 c[4] + c[5]}

```
Array[c, 5].g
```

2 298 045 c[1] - 710 142 c[2] + 81 000 c[3] - 4050 c[4] + 75 c[5]

```
cert = Flatten[Array[c, 5] /.
    FindInstance[2 298 045 c[1] - 710 142 c[2] + 81 000 c[3] - 4050 c[4] + 75 c[5] < 0 &&
      30 719 c[1] - 9474 c[2] + 1080 c[3] - 54 c[4] + c[5] ≥ 0 &&
      30 615 c[1] - 9466 c[2] + 1080 c[3] - 54 c[4] + c[5] ≥ 0 &&
      30 495 c[1] - 9458 c[2] + 1080 c[3] - 54 c[4] + c[5] ≥ 0, Array[c, 5], Integers]]
```

{18 413, 257 776, 0, 0, 1 876 556 160}

```
GCD[18 413, 257 776, 0, 0, 1 876 556 160]
```

1

```
Reverse[cert]
```

{1 876 556 160, 0, 0, 257 776, 18 413}

```
cert.g
```
$-1\,949\,607$

```
cert.Transpose[A]
```
$\{15\,283,\ 162\,539,\ 15\,187\}$

```
chi = (-15 + x)^14 (-14 + x) (5 + x)^56 (191 - 28 x + x^2)^2
```
$(-15 + x)^{14}\ (-14 + x)\ (5 + x)^{56}\ \left(191 - 28\,x + x^2\right)^2$

```
CoefficientList[feasibleinterlacingpolylist[chi], x]
```
$\{\{26\,549,\ -8476,\ 1002,\ -52,\ 1\},$
$\ \{26\,445,\ -8468,\ 1002,\ -52,\ 1\},\ \{26\,325,\ -8460,\ 1002,\ -52,\ 1\}\}$

```
A = {{26 549, -8476, 1002, -52, 1},
    {26 445, -8468, 1002, -52, 1}, {26 325, -8460, 1002, -52, 1}};
```

```
A // MatrixForm
```
$$\begin{pmatrix} 26\,549 & -8476 & 1002 & -52 & 1 \\ 26\,445 & -8468 & 1002 & -52 & 1 \\ 26\,325 & -8460 & 1002 & -52 & 1 \end{pmatrix}$$

```
g = CoefficientList[D[chi, x] / mu[chi] // Factor, x]
```
$\{1\,985\,855,\ -635\,340,\ 75\,150,\ -3900,\ 75\}$

```
Array[c, 5].Transpose[A]
```
$\{26\,549\,c[1] - 8476\,c[2] + 1002\,c[3] - 52\,c[4] + c[5],$
$\ 26\,445\,c[1] - 8468\,c[2] + 1002\,c[3] - 52\,c[4] + c[5],$
$\ 26\,325\,c[1] - 8460\,c[2] + 1002\,c[3] - 52\,c[4] + c[5]\}$

```
Array[c, 5].g
```
$1\,985\,855\,c[1] - 635\,340\,c[2] + 75\,150\,c[3] - 3900\,c[4] + 75\,c[5]$

```
cert = Flatten[Array[c, 5] /.
    FindInstance[1 985 855 c[1] - 635 340 c[2] + 75 150 c[3] - 3900 c[4] + 75 c[5] < 0 &&
        26 549 c[1] - 8476 c[2] + 1002 c[3] - 52 c[4] + c[5] ≥ 0 &&
        26 445 c[1] - 8468 c[2] + 1002 c[3] - 52 c[4] + c[5] ≥ 0 &&
        26 325 c[1] - 8460 c[2] + 1002 c[3] - 52 c[4] + c[5] ≥ 0, Array[c, 5], Integers]]
```
$\{9645,\ 135\,016,\ 0,\ 0,\ 888\,359\,172\}$

```
GCD[9645, 135 016, 0, 0, 888 359 172]
```
1

```
Reverse[cert]
```

{888 359 172, 0, 0, 135 016, 9645}

```
cert.g
```

−556 065

```
cert.Transpose[A]
```

{28 661, 105 709, 28 437}

```
chi = (-15 + x)^15 (-13 + x)^2 (5 + x)^56 (202 - 29 x + x^2)
```

$(-15 + x)^{15} (-13 + x)^2 (5 + x)^{56} (202 - 29 x + x^2)$

```
CoefficientList[feasibleinterlacingpolylist[chi], x]
```

{{25 857, −8372, 998, −52, 1},
 {25 873, −8372, 998, −52, 1}, {25 961, −8380, 998, −52, 1},
 {25 753, −8364, 998, −52, 1}, {25 769, −8364, 998, −52, 1},
 {25 785, −8364, 998, −52, 1}, {25 649, −8356, 998, −52, 1},
 {25 665, −8356, 998, −52, 1}, {25 545, −8348, 998, −52, 1}}

```
A = {{25 961, -8380, 998, -52, 1},
    {25 857, -8372, 998, -52, 1}, {25 873, -8372, 998, -52, 1},
    {25 753, -8364, 998, -52, 1}, {25 769, -8364, 998, -52, 1},
    {25 785, -8364, 998, -52, 1}, {25 649, -8356, 998, -52, 1},
    {25 665, -8356, 998, -52, 1}, {25 545, -8348, 998, -52, 1}};
```

```
A // MatrixForm
```

$$\begin{pmatrix} 25\,961 & -8380 & 998 & -52 & 1 \\ 25\,857 & -8372 & 998 & -52 & 1 \\ 25\,873 & -8372 & 998 & -52 & 1 \\ 25\,753 & -8364 & 998 & -52 & 1 \\ 25\,769 & -8364 & 998 & -52 & 1 \\ 25\,785 & -8364 & 998 & -52 & 1 \\ 25\,649 & -8356 & 998 & -52 & 1 \\ 25\,665 & -8356 & 998 & -52 & 1 \\ 25\,545 & -8348 & 998 & -52 & 1 \end{pmatrix}$$

```
g = CoefficientList[D[chi, x] / mu[chi] // Factor, x]
```

{1 950 315, −628 716, 74 850, −3900, 75}

```
Array[c, 5].Transpose[A]
```

$\{25\,961\,c[1] - 8380\,c[2] + 998\,c[3] - 52\,c[4] + c[5],$
$25\,857\,c[1] - 8372\,c[2] + 998\,c[3] - 52\,c[4] + c[5],$
$25\,873\,c[1] - 8372\,c[2] + 998\,c[3] - 52\,c[4] + c[5],$
$25\,753\,c[1] - 8364\,c[2] + 998\,c[3] - 52\,c[4] + c[5],$
$25\,769\,c[1] - 8364\,c[2] + 998\,c[3] - 52\,c[4] + c[5],$
$25\,785\,c[1] - 8364\,c[2] + 998\,c[3] - 52\,c[4] + c[5],$
$25\,649\,c[1] - 8356\,c[2] + 998\,c[3] - 52\,c[4] + c[5],$
$25\,665\,c[1] - 8356\,c[2] + 998\,c[3] - 52\,c[4] + c[5],$
$25\,545\,c[1] - 8348\,c[2] + 998\,c[3] - 52\,c[4] + c[5]\}$

```
Array[c, 5].g
```

$1\,950\,315\,c[1] - 628\,716\,c[2] + 74\,850\,c[3] - 3900\,c[4] + 75\,c[5]$

```
cert = Flatten[Array[c, 5] /.
    FindInstance[1 950 315 c[1] - 628 716 c[2] + 74 850 c[3] - 3900 c[4] + 75 c[5] < 0 &&
        25 961 c[1] - 8380 c[2] + 998 c[3] - 52 c[4] + c[5] ≥ 0 &&
        25 857 c[1] - 8372 c[2] + 998 c[3] - 52 c[4] + c[5] ≥ 0 &&
        25 873 c[1] - 8372 c[2] + 998 c[3] - 52 c[4] + c[5] ≥ 0 &&
        25 753 c[1] - 8364 c[2] + 998 c[3] - 52 c[4] + c[5] ≥ 0 &&
        25 769 c[1] - 8364 c[2] + 998 c[3] - 52 c[4] + c[5] ≥ 0 &&
        25 785 c[1] - 8364 c[2] + 998 c[3] - 52 c[4] + c[5] ≥ 0 &&
        25 649 c[1] - 8356 c[2] + 998 c[3] - 52 c[4] + c[5] ≥ 0 &&
        25 665 c[1] - 8356 c[2] + 998 c[3] - 52 c[4] + c[5] ≥ 0 &&
        25 545 c[1] - 8348 c[2] + 998 c[3] - 52 c[4] + c[5] ≥ 0, Array[c, 5], Integers]]
```

$\{-1033, -3203, 0, 0, 0\}$

```
GCD[-1033, -3203, 0, 0, 0]
```

1

```
Reverse[cert]
```

$\{0, 0, 0, -3203, -1033\}$

```
cert.g
```

$-898\,047$

```
cert.Transpose[A]
```

$\{23\,427, 105\,235, 88\,707, 187\,043, 170\,515, 153\,987, 268\,851, 252\,323, 350\,659\}$

```
chi = (-17 + x) (-15 + x)^14 (-13 + x)^2 (5 + x)^56 (178 - 27 x + x^2)
```

$(-17 + x)\,(-15 + x)^{14}\,(-13 + x)^2\,(5 + x)^{56}\,\left(178 - 27\,x + x^2\right)$

```
CoefficientList[feasibleinterlacingpolylist[chi], x]
```

{{-389 623, 151 677, -23 350, 1778, -67, 1},
 {-387 855, 151 437, -23 342, 1778, -67, 1},
 {-388 095, 151 453, -23 342, 1778, -67, 1},
 {-388 335, 151 469, -23 342, 1778, -67, 1},
 {-386 295, 151 213, -23 334, 1778, -67, 1},
 {-386 535, 151 229, -23 334, 1778, -67, 1},
 {-386 775, 151 245, -23 334, 1778, -67, 1},
 {-384 735, 150 989, -23 326, 1778, -67, 1},
 {-384 975, 151 005, -23 326, 1778, -67, 1},
 {-383 175, 150 765, -23 318, 1778, -67, 1}}

```
A = {{-389 623, 151 677, -23 350, 1778, -67, 1},
    {-387 855, 151 437, -23 342, 1778, -67, 1}, {-388 095, 151 453,
      -23 342, 1778, -67, 1}, {-388 335, 151 469, -23 342, 1778, -67, 1},
    {-386 295, 151 213, -23 334, 1778, -67, 1}, {-386 535, 151 229,
      -23 334, 1778, -67, 1}, {-386 775, 151 245, -23 334, 1778, -67, 1},
    {-384 735, 150 989, -23 326, 1778, -67, 1}, {-384 975, 151 005, -23 326,
      1778, -67, 1}, {-383 175, 150 765, -23 318, 1778, -67, 1}};
```

```
A // MatrixForm
```

$$\begin{pmatrix}
-389\,623 & 151\,677 & -23\,350 & 1778 & -67 & 1 \\
-387\,855 & 151\,437 & -23\,342 & 1778 & -67 & 1 \\
-388\,095 & 151\,453 & -23\,342 & 1778 & -67 & 1 \\
-388\,335 & 151\,469 & -23\,342 & 1778 & -67 & 1 \\
-386\,295 & 151\,213 & -23\,334 & 1778 & -67 & 1 \\
-386\,535 & 151\,229 & -23\,334 & 1778 & -67 & 1 \\
-386\,775 & 151\,245 & -23\,334 & 1778 & -67 & 1 \\
-384\,735 & 150\,989 & -23\,326 & 1778 & -67 & 1 \\
-384\,975 & 151\,005 & -23\,326 & 1778 & -67 & 1 \\
-383\,175 & 150\,765 & -23\,318 & 1778 & -67 & 1
\end{pmatrix}$$

```
g = CoefficientList[D[chi, x] / mu[chi] // Factor, x]
```

{-29 215 285, 11 374 255, -1 751 178, 133 350, -5025, 75}

```
Array[c, 6].Transpose[A]
```

{-389 623 c[1] + 151 677 c[2] - 23 350 c[3] + 1778 c[4] - 67 c[5] + c[6],
 -387 855 c[1] + 151 437 c[2] - 23 342 c[3] + 1778 c[4] - 67 c[5] + c[6],
 -388 095 c[1] + 151 453 c[2] - 23 342 c[3] + 1778 c[4] - 67 c[5] + c[6],
 -388 335 c[1] + 151 469 c[2] - 23 342 c[3] + 1778 c[4] - 67 c[5] + c[6],
 -386 295 c[1] + 151 213 c[2] - 23 334 c[3] + 1778 c[4] - 67 c[5] + c[6],
 -386 535 c[1] + 151 229 c[2] - 23 334 c[3] + 1778 c[4] - 67 c[5] + c[6],
 -386 775 c[1] + 151 245 c[2] - 23 334 c[3] + 1778 c[4] - 67 c[5] + c[6],
 -384 735 c[1] + 150 989 c[2] - 23 326 c[3] + 1778 c[4] - 67 c[5] + c[6],
 -384 975 c[1] + 151 005 c[2] - 23 326 c[3] + 1778 c[4] - 67 c[5] + c[6],
 -383 175 c[1] + 150 765 c[2] - 23 318 c[3] + 1778 c[4] - 67 c[5] + c[6]}

```
Array[c, 6].g
```

-29 215 285 c[1] + 11 374 255 c[2] - 1 751 178 c[3] + 133 350 c[4] - 5025 c[5] + 75 c[6]

```
cert = Flatten[
  Array[c, 6] /. FindInstance[-29 215 285 c[1] + 11 374 255 c[2] - 1 751 178 c[3] +
      133 350 c[4] - 5025 c[5] + 75 c[6] < 0 &&
    -389 623 c[1] + 151 677 c[2] - 23 350 c[3] + 1778 c[4] - 67 c[5] + c[6] ≥ 0 &&
    -387 855 c[1] + 151 437 c[2] - 23 342 c[3] + 1778 c[4] - 67 c[5] + c[6] ≥ 0 &&
    -388 095 c[1] + 151 453 c[2] - 23 342 c[3] + 1778 c[4] - 67 c[5] + c[6] ≥ 0 &&
    -388 335 c[1] + 151 469 c[2] - 23 342 c[3] + 1778 c[4] - 67 c[5] + c[6] ≥ 0 &&
    -386 295 c[1] + 151 213 c[2] - 23 334 c[3] + 1778 c[4] - 67 c[5] + c[6] ≥ 0 &&
    -386 535 c[1] + 151 229 c[2] - 23 334 c[3] + 1778 c[4] - 67 c[5] + c[6] ≥ 0 &&
    -386 775 c[1] + 151 245 c[2] - 23 334 c[3] + 1778 c[4] - 67 c[5] + c[6] ≥ 0 &&
    -384 735 c[1] + 150 989 c[2] - 23 326 c[3] + 1778 c[4] - 67 c[5] + c[6] ≥ 0 &&
    -384 975 c[1] + 151 005 c[2] - 23 326 c[3] + 1778 c[4] - 67 c[5] + c[6] ≥ 0 &&
    -383 175 c[1] + 150 765 c[2] - 23 318 c[3] + 1778 c[4] - 67 c[5] + c[6] ≥ 0,
    Array[c, 6], Integers]]
```

{16 674, 123 379, 523 203, 0, 0, 0}

```
GCD[16 674, 123 379, 523 203, 0, 0, 0]
```

1

```
Reverse[cert]
```

{0, 0, 0, 523 203, 123 379, 16 674}

```
cert.g
```

-13 037 579

```
cert.Transpose[A]
```

{392 631, 4 446 927, 2 419 231, 391 535, 7 007 095,
 4 979 399, 2 951 703, 9 567 263, 7 539 567, 12 127 431}

```
chi = (-15 + x)^16 (-11 + x) (5 + x)^56 (206 - 29 x + x^2)
```

$(-15 + x)^{16} (-11 + x) (5 + x)^{56} (206 - 29 x + x^2)$

```
CoefficientList[feasibleinterlacingpolylist[chi], x]
```

{{22 451, -7486, 924, -50, 1},
 {22 347, -7478, 924, -50, 1}, {22 363, -7478, 924, -50, 1},
 {22 243, -7470, 924, -50, 1}, {22 259, -7470, 924, -50, 1},
 {22 275, -7470, 924, -50, 1}, {22 155, -7462, 924, -50, 1}}

```
A = {{22 451, -7486, 924, -50, 1},
   {22 347, -7478, 924, -50, 1}, {22 363, -7478, 924, -50, 1},
   {22 243, -7470, 924, -50, 1}, {22 259, -7470, 924, -50, 1},
   {22 275, -7470, 924, -50, 1}, {22 155, -7462, 924, -50, 1}};
```

```
A // MatrixForm
```

$$\begin{pmatrix} 22\,451 & -7486 & 924 & -50 & 1 \\ 22\,347 & -7478 & 924 & -50 & 1 \\ 22\,363 & -7478 & 924 & -50 & 1 \\ 22\,243 & -7470 & 924 & -50 & 1 \\ 22\,259 & -7470 & 924 & -50 & 1 \\ 22\,275 & -7470 & 924 & -50 & 1 \\ 22\,155 & -7462 & 924 & -50 & 1 \end{pmatrix}$$

```
g = CoefficientList[D[chi, x] / mu[chi] // Factor, x]
```

$\{1\,682\,785, -561\,402, 69\,300, -3750, 75\}$

```
Array[c, 5].Transpose[A]
```

$\{22\,451\,c[1] - 7486\,c[2] + 924\,c[3] - 50\,c[4] + c[5],$
$\;\;22\,347\,c[1] - 7478\,c[2] + 924\,c[3] - 50\,c[4] + c[5],$
$\;\;22\,363\,c[1] - 7478\,c[2] + 924\,c[3] - 50\,c[4] + c[5],$
$\;\;22\,243\,c[1] - 7470\,c[2] + 924\,c[3] - 50\,c[4] + c[5],$
$\;\;22\,259\,c[1] - 7470\,c[2] + 924\,c[3] - 50\,c[4] + c[5],$
$\;\;22\,275\,c[1] - 7470\,c[2] + 924\,c[3] - 50\,c[4] + c[5],$
$\;\;22\,155\,c[1] - 7462\,c[2] + 924\,c[3] - 50\,c[4] + c[5]\}$

```
Array[c, 5].g
```

$1\,682\,785\,c[1] - 561\,402\,c[2] + 69\,300\,c[3] - 3750\,c[4] + 75\,c[5]$

```
cert = Flatten[Array[c, 5] /.
    FindInstance[1 682 785 c[1] - 561 402 c[2] + 69 300 c[3] - 3750 c[4] + 75 c[5] < 0 &&
      22 451 c[1] - 7486 c[2] + 924 c[3] - 50 c[4] + c[5] ≥ 0 &&
      22 347 c[1] - 7478 c[2] + 924 c[3] - 50 c[4] + c[5] ≥ 0 &&
      22 363 c[1] - 7478 c[2] + 924 c[3] - 50 c[4] + c[5] ≥ 0 &&
      22 243 c[1] - 7470 c[2] + 924 c[3] - 50 c[4] + c[5] ≥ 0 &&
      22 259 c[1] - 7470 c[2] + 924 c[3] - 50 c[4] + c[5] ≥ 0 &&
      22 275 c[1] - 7470 c[2] + 924 c[3] - 50 c[4] + c[5] ≥ 0 &&
      22 155 c[1] - 7462 c[2] + 924 c[3] - 50 c[4] + c[5] ≥ 0, Array[c, 5], Integers]]
```

$\{5571, 72\,416, 0, 0, 417\,044\,628\}$

```
GCD[5571, 72 416, 0, 0, 417 044 628]
```

1

```
Reverse[cert]
```

$\{417\,044\,628, 0, 0, 72\,416, 5571\}$

```
cert.g
```

$-1\,344\,897$

```
cert.Transpose[A]
```

$\{12\,973, 12\,917, 102\,053, 12\,861, 101\,997, 191\,133, 101\,941\}$

```
chi = (-15 + x)^16 (-13 + x) (5 + x)^56 (174 - 27 x + x^2)
```

$(-15 + x)^{16} (-13 + x) (5 + x)^{56} (174 - 27 x + x^2)$

```
CoefficientList[feasibleinterlacingpolylist[chi], x]
```

{{22 347, -7478, 924, -50, 1}, {22 363, -7478, 924, -50, 1},
 {22 243, -7470, 924, -50, 1}, {22 259, -7470, 924, -50, 1},
 {22 275, -7470, 924, -50, 1}, {22 139, -7462, 924, -50, 1},
 {22 155, -7462, 924, -50, 1}, {22 035, -7454, 924, -50, 1}}

```
A = {{22 347, -7478, 924, -50, 1}, {22 363, -7478, 924, -50, 1},
    {22 243, -7470, 924, -50, 1}, {22 259, -7470, 924, -50, 1},
    {22 275, -7470, 924, -50, 1}, {22 139, -7462, 924, -50, 1},
    {22 155, -7462, 924, -50, 1}, {22 035, -7454, 924, -50, 1}};
```

```
A // MatrixForm
```

$$\begin{pmatrix} 22\,347 & -7478 & 924 & -50 & 1 \\ 22\,363 & -7478 & 924 & -50 & 1 \\ 22\,243 & -7470 & 924 & -50 & 1 \\ 22\,259 & -7470 & 924 & -50 & 1 \\ 22\,275 & -7470 & 924 & -50 & 1 \\ 22\,139 & -7462 & 924 & -50 & 1 \\ 22\,155 & -7462 & 924 & -50 & 1 \\ 22\,035 & -7454 & 924 & -50 & 1 \end{pmatrix}$$

```
g = CoefficientList[D[chi, x] / mu[chi] // Factor, x]
```

{1 679 745, -561 114, 69 300, -3750, 75}

```
Array[c, 5].Transpose[A]
```

{22 347 c[1] - 7478 c[2] + 924 c[3] - 50 c[4] + c[5],
 22 363 c[1] - 7478 c[2] + 924 c[3] - 50 c[4] + c[5],
 22 243 c[1] - 7470 c[2] + 924 c[3] - 50 c[4] + c[5],
 22 259 c[1] - 7470 c[2] + 924 c[3] - 50 c[4] + c[5],
 22 275 c[1] - 7470 c[2] + 924 c[3] - 50 c[4] + c[5],
 22 139 c[1] - 7462 c[2] + 924 c[3] - 50 c[4] + c[5],
 22 155 c[1] - 7462 c[2] + 924 c[3] - 50 c[4] + c[5],
 22 035 c[1] - 7454 c[2] + 924 c[3] - 50 c[4] + c[5]}

```
Array[c, 5].g
```

1 679 745 c[1] - 561 114 c[2] + 69 300 c[3] - 3750 c[4] + 75 c[5]

```
cert = Flatten[Array[c, 5] /.
    FindInstance[1 679 745 c[1] – 561 114 c[2] + 69 300 c[3] – 3750 c[4] + 75 c[5] < 0 &&
      22 347 c[1] – 7478 c[2] + 924 c[3] – 50 c[4] + c[5] ≥ 0 &&
      22 363 c[1] – 7478 c[2] + 924 c[3] – 50 c[4] + c[5] ≥ 0 &&
      22 243 c[1] – 7470 c[2] + 924 c[3] – 50 c[4] + c[5] ≥ 0 &&
      22 259 c[1] – 7470 c[2] + 924 c[3] – 50 c[4] + c[5] ≥ 0 &&
      22 275 c[1] – 7470 c[2] + 924 c[3] – 50 c[4] + c[5] ≥ 0 &&
      22 139 c[1] – 7462 c[2] + 924 c[3] – 50 c[4] + c[5] ≥ 0 &&
      22 155 c[1] – 7462 c[2] + 924 c[3] – 50 c[4] + c[5] ≥ 0 &&
      22 035 c[1] – 7454 c[2] + 924 c[3] – 50 c[4] + c[5] ≥ 0, Array[c, 5], Integers]]
```

{–1337, –3999, 0, 0, 0}

```
GCD[–1337, –3999, 0, 0, 0]
```

1

```
Reverse[cert]
```

{0, 0, 0, –3999, –1337}

```
cert.g
```

– 1 924 179

```
cert.Transpose[A]
```

{26 583, 5191, 133 639, 112 247, 90 855, 240 695, 219 303, 347 751}

```
chi = (–18 + x) (–15 + x)^14 (–13 + x)^4 (5 + x)^56
```

$(-18 + x) \ (-15 + x)^{14} \ (-13 + x)^4 \ (5 + x)^{56}$

```
CoefficientList[feasibleinterlacingpolylist[chi], x]
```

{{–2295, 543, –41, 1}, {–2303, 543, –41, 1},
 {–2311, 543, –41, 1}, {–2319, 543, –41, 1}}

```
A = {{-2319, 543, -41, 1}, {-2311, 543, -41, 1},
    {-2303, 543, -41, 1}, {-2295, 543, -41, 1}};
```

```
A // MatrixForm
```

$$\begin{pmatrix} -2319 & 543 & -41 & 1 \\ -2311 & 543 & -41 & 1 \\ -2303 & 543 & -41 & 1 \\ -2295 & 543 & -41 & 1 \end{pmatrix}$$

```
g = CoefficientList[D[chi, x] / mu[chi] // Factor, x]
```

{–173 805, 40 725, –3075, 75}

```
FindInstance[n[1] ≥ 0 && n[2] ≥ 0 && n[3] ≥ 0 && n[4] ≥ 0 && Array[n, 4].A == g,
  Array[n, 4], Integers]
```

$\{\{n[1] \to 68, n[2] \to 0, n[3] \to 6, n[4] \to 1\}\}$

```
Array[c, 4].Transpose[A]
```

$\{-2319\,c[1] + 543\,c[2] - 41\,c[3] + c[4], -2311\,c[1] + 543\,c[2] - 41\,c[3] + c[4],$
$-2303\,c[1] + 543\,c[2] - 41\,c[3] + c[4], -2295\,c[1] + 543\,c[2] - 41\,c[3] + c[4]\}$

```
Array[c, 4].g
```

$-173\,805\,c[1] + 40\,725\,c[2] - 3075\,c[3] + 75\,c[4]$

```
warrant = Flatten[
   Array[c, 4] /. FindInstance[-173 805 c[1] + 40 725 c[2] - 3075 c[3] + 75 c[4] < 0 &&
       -2319 c[1] + 543 c[2] - 41 c[3] + c[4] < 0 && -2311 c[1] + 543 c[2] - 41 c[3] + c[4] ≥
         0 && -2303 c[1] + 543 c[2] - 41 c[3] + c[4] ≥ 0 &&
       -2295 c[1] + 543 c[2] - 41 c[3] + c[4] ≥ 0, Array[c, 4], Integers]]
```

$\{453, 0, 0, 1\,048\,533\}$

```
GCD[453, 0, 0, 1 048 533]
```

3

```
warrant = warrant / 3
```

$\{151, 0, 0, 349\,511\}$

```
Reverse[warrant]
```

$\{349\,511, 0, 0, 151\}$

```
warrant.g
```

$-31\,230$

```
warrant.Transpose[A]
```

$\{-658, 550, 1758, 2966\}$

```
chiwarrant = (-15 + x)^13 (-13 + x)^3 (5 + x)^55 (-2319 + 543 x - 41 x^2 + x^3)
```

$(-15 + x)^{13}\,(-13 + x)^3\,(5 + x)^{55}\,\left(-2319 + 543\,x - 41\,x^2 + x^3\right)$

```
list = feasibleinterlacingpolylist[chiwarrant]
```

$\left\{\left(128 - 23\,x + x^2\right)\,\left(-2319 + 543\,x - 41\,x^2 + x^3\right),\right.$
$\left(-13 + x\right)\,\left(22\,832 - 7693\,x + 951\,x^2 - 51\,x^3 + x^4\right),$
$\left(-13 + x\right)\,\left(22\,764 - 7689\,x + 951\,x^2 - 51\,x^3 + x^4\right),$
$\left(-13 + x\right)\,\left(22\,772 - 7689\,x + 951\,x^2 - 51\,x^3 + x^4\right),$
$-296\,156 + 122\,737\,x - 20\,052\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$
$\left(-13 + x\right)\,\left(22\,780 - 7689\,x + 951\,x^2 - 51\,x^3 + x^4\right),$
$-296\,260 + 122\,745\,x - 20\,052\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$(-13 + x)$ $(-9 + x)$ $\left(-2532 + 573\,x - 42\,x^2 + x^3\right)$, $(-13 + x)$ $\left(164 - 27\,x + x^2\right)$ $\left(139 - 24\,x + x^2\right)$,

$(-13 + x)$ $\left(22\,696 - 7685\,x + 951\,x^2 - 51\,x^3 + x^4\right)$,

$(-13 + x)$ $(-11 + x)$ $\left(-2064 + 511\,x - 40\,x^2 + x^3\right)$,

$(-13 + x)$ $\left(22\,712 - 7685\,x + 951\,x^2 - 51\,x^3 + x^4\right)$,

$(-13 + x)$ $\left(22\,720 - 7685\,x + 951\,x^2 - 51\,x^3 + x^4\right)$,

$-295\,480 + 122\,633\,x - 20\,048\,x^2 + 1614\,x^3 - 64\,x^4 + x^5$,

$(-13 + x)$ $\left(22\,728 - 7685\,x + 951\,x^2 - 51\,x^3 + x^4\right)$,

$-295\,584 + 122\,641\,x - 20\,048\,x^2 + 1614\,x^3 - 64\,x^4 + x^5$,

$(-13 + x)$ $\left(22\,736 - 7685\,x + 951\,x^2 - 51\,x^3 + x^4\right)$,

$-295\,688 + 122\,649\,x - 20\,048\,x^2 + 1614\,x^3 - 64\,x^4 + x^5$,

$(-13 + x)$ $\left(22\,744 - 7685\,x + 951\,x^2 - 51\,x^3 + x^4\right)$,

$\left(139 - 24\,x + x^2\right)$ $\left(-2128 + 515\,x - 40\,x^2 + x^3\right)$, $(-13 + x)$ $(-9 + x)$ $\left(-2528 + 573\,x - 42\,x^2 + x^3\right)$,

$(-13 + x)$ $\left(22\,644 - 7681\,x + 951\,x^2 - 51\,x^3 + x^4\right)$,

$(-13 + x)$ $\left(22\,652 - 7681\,x + 951\,x^2 - 51\,x^3 + x^4\right)$,

$(-13 + x)$ $(-11 + x)$ $\left(-2060 + 511\,x - 40\,x^2 + x^3\right)$,

$(-13 + x)$ $\left(22\,668 - 7681\,x + 951\,x^2 - 51\,x^3 + x^4\right)$,

$-294\,804 + 122\,529\,x - 20\,044\,x^2 + 1614\,x^3 - 64\,x^4 + x^5$,

$(-13 + x)$ $\left(22\,676 - 7681\,x + 951\,x^2 - 51\,x^3 + x^4\right)$,

$-294\,908 + 122\,537\,x - 20\,044\,x^2 + 1614\,x^3 - 64\,x^4 + x^5$,

$(-13 + x)$ $\left(22\,684 - 7681\,x + 951\,x^2 - 51\,x^3 + x^4\right)$,

$-295\,012 + 122\,545\,x - 20\,044\,x^2 + 1614\,x^3 - 64\,x^4 + x^5$,

$(-13 + x)$ $\left(183 - 28\,x + x^2\right)$ $\left(124 - 23\,x + x^2\right)$,

$-295\,116 + 122\,553\,x - 20\,044\,x^2 + 1614\,x^3 - 64\,x^4 + x^5$,

$(-13 + x)$ $\left(22\,700 - 7681\,x + 951\,x^2 - 51\,x^3 + x^4\right)$, $(-9 + x)$ $\left(236 - 31\,x + x^2\right)$ $\left(139 - 24\,x + x^2\right)$,

$-295\,220 + 122\,561\,x - 20\,044\,x^2 + 1614\,x^3 - 64\,x^4 + x^5$,

$(-13 + x)$ $\left(22\,708 - 7681\,x + 951\,x^2 - 51\,x^3 + x^4\right)$,

$-295\,324 + 122\,569\,x - 20\,044\,x^2 + 1614\,x^3 - 64\,x^4 + x^5$,

$(-13 + x)$ $(-9 + x)$ $\left(-2524 + 573\,x - 42\,x^2 + x^3\right)$,

$(-13 + x)$ $\left(22\,584 - 7677\,x + 951\,x^2 - 51\,x^3 + x^4\right)$,

$(-13 + x)$ $\left(22\,592 - 7677\,x + 951\,x^2 - 51\,x^3 + x^4\right)$,

$(-13 + x)$ $\left(200 - 29\,x + x^2\right)$ $\left(113 - 22\,x + x^2\right)$, $(-13 + x)$ $\left(22\,608 - 7677\,x + 951\,x^2 - 51\,x^3 + x^4\right)$,

$(-13 + x)$ $(-11 + x)$ $\left(-2056 + 511\,x - 40\,x^2 + x^3\right)$,

$-294\,128 + 122\,425\,x - 20\,040\,x^2 + 1614\,x^3 - 64\,x^4 + x^5$,

$(-13 + x)$ $\left(22\,624 - 7677\,x + 951\,x^2 - 51\,x^3 + x^4\right)$,

$-294\,232 + 122\,433\,x - 20\,040\,x^2 + 1614\,x^3 - 64\,x^4 + x^5$,

$(-13 + x)$ $\left(22\,632 - 7677\,x + 951\,x^2 - 51\,x^3 + x^4\right)$,

$-294\,336 + 122\,441\,x - 20\,040\,x^2 + 1614\,x^3 - 64\,x^4 + x^5$,

$(-13 + x)$ $\left(22\,640 - 7677\,x + 951\,x^2 - 51\,x^3 + x^4\right)$,

$-294\,440 + 122\,449\,x - 20\,040\,x^2 + 1614\,x^3 - 64\,x^4 + x^5$,

$(-13 + x)$ $\left(149 - 26\,x + x^2\right)$ $\left(152 - 25\,x + x^2\right)$,

$-294\,560 + 122\,457\,x - 20\,040\,x^2 + 1614\,x^3 - 64\,x^4 + x^5$,

$-294\,544 + 122\,457\,x - 20\,040\,x^2 + 1614\,x^3 - 64\,x^4 + x^5$,

$(-13 + x)$ $\left(22\,656 - 7677\,x + 951\,x^2 - 51\,x^3 + x^4\right)$,

$-294\,664 + 122\,465\,x - 20\,040\,x^2 + 1614\,x^3 - 64\,x^4 + x^5$,

$$-294\,648 + 122\,465\,x - 20\,040\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$$

$$(-13 + x)\left(22\,664 - 7677\,x + 951\,x^2 - 51\,x^3 + x^4\right),$$

$$(-9 + x)\left(32\,752 - 9969\,x + 1119\,x^2 - 55\,x^3 + x^4\right),$$

$$-294\,752 + 122\,473\,x - 20\,040\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$$

$$(-13 + x)\left(22\,672 - 7677\,x + 951\,x^2 - 51\,x^3 + x^4\right),$$

$$(-15 + x)(-13 + x)(-9 + x)\left(168 - 27\,x + x^2\right),$$

$$(-13 + x)\left(22\,532 - 7673\,x + 951\,x^2 - 51\,x^3 + x^4\right),$$

$$(-13 + x)\left(22\,540 - 7673\,x + 951\,x^2 - 51\,x^3 + x^4\right),$$

$$(-13 + x)\left(22\,548 - 7673\,x + 951\,x^2 - 51\,x^3 + x^4\right),$$

$$(-13 + x)\left(22\,556 - 7673\,x + 951\,x^2 - 51\,x^3 + x^4\right),$$

$$(-11 + x)\left(236 - 31\,x + x^2\right)\left(113 - 22\,x + x^2\right),\ (-13 + x)\left(22\,564 - 7673\,x + 951\,x^2 - 51\,x^3 + x^4\right),$$

$$-293\,452 + 122\,321\,x - 20\,036\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$$

$$(-13 + x)(-11 + x)\left(-2052 + 511\,x - 40\,x^2 + x^3\right),$$

$$-293\,556 + 122\,329\,x - 20\,036\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$$

$$(-13 + x)\left(22\,580 - 7673\,x + 951\,x^2 - 51\,x^3 + x^4\right),$$

$$-293\,660 + 122\,337\,x - 20\,036\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$$

$$(-13 + x)\left(22\,588 - 7673\,x + 951\,x^2 - 51\,x^3 + x^4\right),$$

$$-293\,780 + 122\,345\,x - 20\,036\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$$

$$-293\,764 + 122\,345\,x - 20\,036\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$$

$$(-13 + x)\left(22\,596 - 7673\,x + 951\,x^2 - 51\,x^3 + x^4\right),$$

$$-293\,884 + 122\,353\,x - 20\,036\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$$

$$-293\,868 + 122\,353\,x - 20\,036\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$$

$$(-13 + x)\left(22\,604 - 7673\,x + 951\,x^2 - 51\,x^3 + x^4\right),$$

$$-293\,988 + 122\,361\,x - 20\,036\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$$

$$-293\,972 + 122\,361\,x - 20\,036\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$$

$$(-13 + x)\left(22\,612 - 7673\,x + 951\,x^2 - 51\,x^3 + x^4\right),$$

$$-294\,092 + 122\,369\,x - 20\,036\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$$

$$-294\,076 + 122\,369\,x - 20\,036\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$$

$$(-15 + x)(-13 + x)\left(-1508 + 411\,x - 36\,x^2 + x^3\right),$$

$$-294\,196 + 122\,377\,x - 20\,036\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$$

$$(-15 + x)\left(19\,612 - 6851\,x + 879\,x^2 - 49\,x^3 + x^4\right),$$

$$(-13 + x)\left(22\,480 - 7669\,x + 951\,x^2 - 51\,x^3 + x^4\right),$$

$$(-13 + x)\left(22\,488 - 7669\,x + 951\,x^2 - 51\,x^3 + x^4\right),$$

$$(-13 + x)\left(22\,496 - 7669\,x + 951\,x^2 - 51\,x^3 + x^4\right),$$

$$(-13 + x)(-8 + x)\left(-2813 + 607\,x - 43\,x^2 + x^3\right),$$

$$-292\,672 + 122\,209\,x - 20\,032\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$$

$$(-13 + x)\left(22\,512 - 7669\,x + 951\,x^2 - 51\,x^3 + x^4\right),$$

$$(-11 + x)\left(26\,616 - 8691\,x + 1031\,x^2 - 53\,x^3 + x^4\right),$$

$$(-13 + x)\left(22\,520 - 7669\,x + 951\,x^2 - 51\,x^3 + x^4\right),$$

$$-292\,880 + 122\,225\,x - 20\,032\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$$

$$(-13 + x)(-11 + x)\left(-2048 + 511\,x - 40\,x^2 + x^3\right),$$

$$-292\,984 + 122\,233\,x - 20\,032\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$$

$$(-13 + x)\left(22\,536 - 7669\,x + 951\,x^2 - 51\,x^3 + x^4\right),$$

$$-293\,104 + 122\,241\,x - 20\,032\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$$

$-293\,088 + 122\,241\,x - 20\,032\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$(-13 + x)\,(22\,544 - 7669\,x + 951\,x^2 - 51\,x^3 + x^4),$

$(152 - 25\,x + x^2)\,(-1929 + 487\,x - 39\,x^2 + x^3),$

$-293\,192 + 122\,249\,x - 20\,032\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$(-13 + x)\,(22\,552 - 7669\,x + 951\,x^2 - 51\,x^3 + x^4),$

$-293\,312 + 122\,257\,x - 20\,032\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$-293\,296 + 122\,257\,x - 20\,032\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$(-15 + x)\,(-13 + x)\,(-1504 + 411\,x - 36\,x^2 + x^3),$

$-293\,416 + 122\,265\,x - 20\,032\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$(-15 + x)\,(19\,560 - 6847\,x + 879\,x^2 - 49\,x^3 + x^4),$

$-293\,536 + 122\,273\,x - 20\,032\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$(-15 + x)\,(19\,568 - 6847\,x + 879\,x^2 - 49\,x^3 + x^4),$

$(-15 + x)\,(19\,576 - 6847\,x + 879\,x^2 - 49\,x^3 + x^4),$

$(-13 + x)\,(-12 + x)\,(-1869 + 483\,x - 39\,x^2 + x^3),$

$(-13 + x)\,(22\,436 - 7665\,x + 951\,x^2 - 51\,x^3 + x^4),$

$(-13 + x)\,(22\,444 - 7665\,x + 951\,x^2 - 51\,x^3 + x^4),$

$(-13 + x)\,(22\,452 - 7665\,x + 951\,x^2 - 51\,x^3 + x^4),$

$-291\,996 + 122\,105\,x - 20\,028\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$(-13 + x)\,(22\,460 - 7665\,x + 951\,x^2 - 51\,x^3 + x^4),$

$-292\,100 + 122\,113\,x - 20\,028\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$(-13 + x)\,(22\,468 - 7665\,x + 951\,x^2 - 51\,x^3 + x^4),$

$(-11 + x)\,(26\,564 - 8687\,x + 1031\,x^2 - 53\,x^3 + x^4),$

$(-13 + x)\,(22\,476 - 7665\,x + 951\,x^2 - 51\,x^3 + x^4),$

$-292\,308 + 122\,129\,x - 20\,028\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$(-13 + x)\,(-11 + x)\,(-2044 + 511\,x - 40\,x^2 + x^3),$

$-292\,428 + 122\,137\,x - 20\,028\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$-292\,412 + 122\,137\,x - 20\,028\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$(-13 + x)\,(22\,492 - 7665\,x + 951\,x^2 - 51\,x^3 + x^4),$

$-292\,532 + 122\,145\,x - 20\,028\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$-292\,516 + 122\,145\,x - 20\,028\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$(-15 + x)\,(-13 + x)\,(-1500 + 411\,x - 36\,x^2 + x^3),$

$-292\,636 + 122\,153\,x - 20\,028\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$(-15 + x)\,(19\,508 - 6843\,x + 879\,x^2 - 49\,x^3 + x^4),$

$(-17 + x)\,(-15 + x)\,(-1148 + 335\,x - 32\,x^2 + x^3),$

$(-15 + x)\,(19\,524 - 6843\,x + 879\,x^2 - 49\,x^3 + x^4),$

$(-13 + x)\,(22\,368 - 7661\,x + 951\,x^2 - 51\,x^3 + x^4),$

$(-13 + x)\,(22\,376 - 7661\,x + 951\,x^2 - 51\,x^3 + x^4),$

$(-13 + x)\,(22\,384 - 7661\,x + 951\,x^2 - 51\,x^3 + x^4),$

$(-13 + x)\,(22\,392 - 7661\,x + 951\,x^2 - 51\,x^3 + x^4),$

$(-13 + x)\,(22\,400 - 7661\,x + 951\,x^2 - 51\,x^3 + x^4),$

$-291\,320 + 122\,001\,x - 20\,024\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$(-13 + x)\,(22\,408 - 7661\,x + 951\,x^2 - 51\,x^3 + x^4),$

$-291\,424 + 122\,009\,x - 20\,024\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$(-13 + x)\,(22\,416 - 7661\,x + 951\,x^2 - 51\,x^3 + x^4),$

$-291\,528 + 122\,017\,x - 20\,024\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$(-13 + x)\left(22\,424 - 7661\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-11 + x)\left(26\,512 - 8683\,x + 1031\,x^2 - 53\,x^3 + x^4\right),$

$(-13 + x)\left(22\,432 - 7661\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$-291\,752 + 122\,033\,x - 20\,024\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$-291\,736 + 122\,033\,x - 20\,024\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$(-17 + x)\,(-15 + x)\,(-13 + x)\,(-11 + x)\,(-8 + x),$

$(-17 + x)\left(17\,168 - 6169\,x + 815\,x^2 - 47\,x^3 + x^4\right),$

$(-15 + x)\left(19\,456 - 6839\,x + 879\,x^2 - 49\,x^3 + x^4\right),$

$(-15 + x)\left(19\,464 - 6839\,x + 879\,x^2 - 49\,x^3 + x^4\right),$

$(-13 + x)\left(22\,316 - 7657\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-13 + x)\left(22\,324 - 7657\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-13 + x)\,(-12 + x)\left(-1861 + 483\,x - 39\,x^2 + x^3\right),$

$(-13 + x)\left(22\,340 - 7657\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$-290\,540 + 121\,889\,x - 20\,020\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$(-13 + x)\left(22\,348 - 7657\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$-290\,644 + 121\,897\,x - 20\,020\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$(-13 + x)\left(22\,356 - 7657\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$-290\,748 + 121\,905\,x - 20\,020\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$(-13 + x)\left(22\,364 - 7657\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$-290\,852 + 121\,913\,x - 20\,020\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$(-17 + x)\,(-13 + x)\left(-1316 + 373\,x - 34\,x^2 + x^3\right),$

$-290\,956 + 121\,921\,x - 20\,020\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$(-15 + x)\,(-13 + x)\left(-1492 + 411\,x - 36\,x^2 + x^3\right),$

$-291\,076 + 121\,929\,x - 20\,020\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$(-15 + x)\,(-11 + x)\left(-1764 + 461\,x - 38\,x^2 + x^3\right),$

$(-15 + x)\left(19\,412 - 6835\,x + 879\,x^2 - 49\,x^3 + x^4\right),$

$(-13 + x)\left(22\,264 - 7653\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-13 + x)\left(22\,272 - 7653\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-13 + x)\left(22\,280 - 7653\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-13 + x)\left(22\,288 - 7653\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$-289\,864 + 121\,785\,x - 20\,016\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$(-13 + x)\left(22\,296 - 7653\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$-289\,968 + 121\,793\,x - 20\,016\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$(-17 + x)\,(-13 + x)\left(-1312 + 373\,x - 34\,x^2 + x^3\right),$

$-290\,072 + 121\,801\,x - 20\,016\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$(-13 + x)\left(22\,312 - 7653\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$-290\,176 + 121\,809\,x - 20\,016\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$(-15 + x)\,(-13 + x)\left(-1488 + 411\,x - 36\,x^2 + x^3\right),$

$-290\,296 + 121\,817\,x - 20\,016\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$(-15 + x)\left(19\,352 - 6831\,x + 879\,x^2 - 49\,x^3 + x^4\right),$

$(-15 + x)\,(-11 + x)\left(-1760 + 461\,x - 38\,x^2 + x^3\right),$

$(-13 + x)\left(22\,212 - 7649\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-13 + x)\left(22\,220 - 7649\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-13 + x) \left(22\,228 - 7649\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-17 + x)\ (-13 + x)\ (-12 + x) \left(109 - 22\,x + x^2\right),$

$-289\,188 + 121\,681\,x - 20\,012\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$(-13 + x) \left(22\,244 - 7649\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$-289\,292 + 121\,689\,x - 20\,012\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$(-13 + x) \left(22\,252 - 7649\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$-289\,396 + 121\,697\,x - 20\,012\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$(-15 + x)\ (-13 + x) \left(-1484 + 411\,x - 36\,x^2 + x^3\right),$

$(-15 + x) \left(19\,300 - 6827\,x + 879\,x^2 - 49\,x^3 + x^4\right),$

$(-15 + x) \left(19\,308 - 6827\,x + 879\,x^2 - 49\,x^3 + x^4\right),$

$(-13 + x)^2 \left(-1704 + 457\,x - 38\,x^2 + x^3\right),\ (-13 + x) \left(22\,160 - 7645\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-17 + x)\ (-13 + x) \left(-1304 + 373\,x - 34\,x^2 + x^3\right),$

$(-13 + x) \left(22\,176 - 7645\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-13 + x) \left(22\,184 - 7645\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$-288\,512 + 121\,577\,x - 20\,008\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$(-13 + x) \left(22\,192 - 7645\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$-288\,616 + 121\,585\,x - 20\,008\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$(-15 + x)\ (-13 + x) \left(-1480 + 411\,x - 36\,x^2 + x^3\right),$

$(-15 + x) \left(19\,248 - 6823\,x + 879\,x^2 - 49\,x^3 + x^4\right),$

$(-17 + x)\ (-13 + x)^2 \left(100 - 21\,x + x^2\right),\ (-13 + x) \left(22\,108 - 7641\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-13 + x) \left(22\,116 - 7641\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-13 + x) \left(22\,124 - 7641\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$-287\,732 + 121\,465\,x - 20\,004\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$(-13 + x) \left(22\,132 - 7641\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$-287\,836 + 121\,473\,x - 20\,004\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$(-15 + x)\ (-13 + x)\ (-12 + x) \left(123 - 24\,x + x^2\right),$

$(-15 + x) \left(19\,196 - 6819\,x + 879\,x^2 - 49\,x^3 + x^4\right),$

$(-13 + x)^2 \left(-1696 + 457\,x - 38\,x^2 + x^3\right),\ (-13 + x) \left(22\,056 - 7637\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-13 + x) \left(22\,064 - 7637\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-13 + x) \left(22\,072 - 7637\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$-287\,056 + 121\,361\,x - 20\,000\,x^2 + 1614\,x^3 - 64\,x^4 + x^5,$

$(-15 + x)\ (-13 + x) \left(-1472 + 411\,x - 36\,x^2 + x^3\right),$

$(-15 + x) \left(19\,144 - 6815\,x + 879\,x^2 - 49\,x^3 + x^4\right),$

$(-13 + x)^2 \left(-1692 + 457\,x - 38\,x^2 + x^3\right),\ (-13 + x) \left(22\,004 - 7633\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-13 + x) \left(22\,012 - 7633\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-15 + x)\ (-13 + x) \left(-1468 + 411\,x - 36\,x^2 + x^3\right),$

$(-15 + x)\ (-12 + x) \left(-1591 + 435\,x - 37\,x^2 + x^3\right),$

$(-13 + x) \left(21\,936 - 7629\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-13 + x)^2 \left(-1688 + 457\,x - 38\,x^2 + x^3\right),\ (-13 + x) \left(21\,952 - 7629\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-15 + x)\ (-13 + x) \left(-1464 + 411\,x - 36\,x^2 + x^3\right),$

$(-13 + x) \left(21\,884 - 7625\,x + 951\,x^2 - 51\,x^3 + x^4\right),\ (-13 + x)^2 \left(-1684 + 457\,x - 38\,x^2 + x^3\right),$

$(-15 + x)\ (-13 + x) \left(-1460 + 411\,x - 36\,x^2 + x^3\right),$

$(-13 + x) \left(21\,832 - 7621\,x + 951\,x^2 - 51\,x^3 + x^4\right),\ (-16 + x)\ (-15 + x)\ (-13 + x)^2\ (-7 + x),$

$(-15 + x)\ (-13 + x) \left(-1452 + 411\,x - 36\,x^2 + x^3\right)\}$

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Length[list]
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239

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listmod32 = modfilter[list * mu[chiwarrant] // Factor, chiSmod32n73, 32]
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$\Big\{ (-15+x)^{12} (-13+x)^3 (5+x)^{54} \left(22\,772 - 7689\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-15+x)^{12} (-13+x)^3 (-9+x) (5+x)^{54} \left(-2532 + 573\,x - 42\,x^2 + x^3\right),$

$(-15+x)^{12} (-13+x)^3 (-11+x) (5+x)^{54} \left(-2064 + 511\,x - 40\,x^2 + x^3\right),$

$(-15+x)^{12} (-13+x)^3 (5+x)^{54} \left(22\,720 - 7685\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-15+x)^{12} (-13+x)^3 (5+x)^{54} \left(22\,736 - 7685\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-15+x)^{12} (-13+x)^3 (-9+x) (5+x)^{54} \left(-2528 + 573\,x - 42\,x^2 + x^3\right),$

$(-15+x)^{12} (-13+x)^2 (5+x)^{54} \left(-294\,908 + 122\,537\,x - 20\,044\,x^2 + 1614\,x^3 - 64\,x^4 + x^5\right),$

$(-15+x)^{12} (-13+x)^2 (5+x)^{54} \left(-295\,116 + 122\,553\,x - 20\,044\,x^2 + 1614\,x^3 - 64\,x^4 + x^5\right),$

$(-15+x)^{12} (-13+x)^2 (5+x)^{54} \left(-295\,324 + 122\,569\,x - 20\,044\,x^2 + 1614\,x^3 - 64\,x^4 + x^5\right),$

$(-15+x)^{12} (-13+x)^2 (5+x)^{54} \left(-294\,232 + 122\,433\,x - 20\,040\,x^2 + 1614\,x^3 - 64\,x^4 + x^5\right),$

$(-15+x)^{12} (-13+x)^2 (5+x)^{54} \left(-294\,440 + 122\,449\,x - 20\,040\,x^2 + 1614\,x^3 - 64\,x^4 + x^5\right),$

$(-15+x)^{12} (-13+x)^2 (5+x)^{54} \left(-294\,648 + 122\,465\,x - 20\,040\,x^2 + 1614\,x^3 - 64\,x^4 + x^5\right),$

$(-15+x)^{12} (-13+x)^3 (5+x)^{54} \left(22\,532 - 7673\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-15+x)^{12} (-13+x)^3 (5+x)^{54} \left(22\,548 - 7673\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-15+x)^{12} (-13+x)^3 (5+x)^{54} \left(22\,564 - 7673\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-15+x)^{12} (-13+x)^3 (5+x)^{54} \left(22\,580 - 7673\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-15+x)^{12} (-13+x)^2 (5+x)^{54} \left(-293\,780 + 122\,345\,x - 20\,036\,x^2 + 1614\,x^3 - 64\,x^4 + x^5\right),$

$(-15+x)^{12} (-13+x)^3 (5+x)^{54} \left(22\,596 - 7673\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-15+x)^{12} (-13+x)^2 (5+x)^{54} \left(-293\,988 + 122\,361\,x - 20\,036\,x^2 + 1614\,x^3 - 64\,x^4 + x^5\right),$

$(-15+x)^{12} (-13+x)^3 (5+x)^{54} \left(22\,612 - 7673\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-15+x)^{12} (-13+x)^2 (5+x)^{54} \left(-294\,196 + 122\,377\,x - 20\,036\,x^2 + 1614\,x^3 - 64\,x^4 + x^5\right),$

$(-15+x)^{12} (-13+x)^3 (5+x)^{54} \left(22\,480 - 7669\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-15+x)^{12} (-13+x)^3 (5+x)^{54} \left(22\,496 - 7669\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-15+x)^{12} (-13+x)^3 (5+x)^{54} \left(22\,512 - 7669\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-15+x)^{12} (-13+x)^3 (-11+x) (5+x)^{54} \left(-2048 + 511\,x - 40\,x^2 + x^3\right),$

$(-15+x)^{12} (-13+x)^2 (5+x)^{54} \left(-293\,104 + 122\,241\,x - 20\,032\,x^2 + 1614\,x^3 - 64\,x^4 + x^5\right),$

$(-15+x)^{12} (-13+x)^3 (5+x)^{54} \left(22\,544 - 7669\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-15+x)^{12} (-13+x)^2 (5+x)^{54} \left(-293\,312 + 122\,257\,x - 20\,032\,x^2 + 1614\,x^3 - 64\,x^4 + x^5\right),$

$(-15+x)^{13} (-13+x)^3 (5+x)^{54} \left(-1504 + 411\,x - 36\,x^2 + x^3\right),$

$(-15+x)^{13} (-13+x)^2 (5+x)^{54} \left(19\,568 - 6847\,x + 879\,x^2 - 49\,x^3 + x^4\right),$

$(-15+x)^{12} (-13+x)^2 (5+x)^{54} \left(-291\,996 + 122\,105\,x - 20\,028\,x^2 + 1614\,x^3 - 64\,x^4 + x^5\right),$

$(-15+x)^{12} (-13+x)^2 (-11+x) (5+x)^{54} \left(26\,564 - 8687\,x + 1031\,x^2 - 53\,x^3 + x^4\right),$

$(-15+x)^{12} (-13+x)^2 (5+x)^{54} \left(-292\,412 + 122\,137\,x - 20\,028\,x^2 + 1614\,x^3 - 64\,x^4 + x^5\right),$

$(-15+x)^{13} (-13+x)^2 (5+x)^{54} \left(19\,508 - 6843\,x + 879\,x^2 - 49\,x^3 + x^4\right),$

$(-15+x)^{13} (-13+x)^2 (5+x)^{54} \left(19\,524 - 6843\,x + 879\,x^2 - 49\,x^3 + x^4\right),$

$(-15+x)^{12} (-13+x)^2 (5+x)^{54} \left(-291\,320 + 122\,001\,x - 20\,024\,x^2 + 1614\,x^3 - 64\,x^4 + x^5\right),$

$(-15+x)^{12} (-13+x)^2 (5+x)^{54} \left(-291\,528 + 122\,017\,x - 20\,024\,x^2 + 1614\,x^3 - 64\,x^4 + x^5\right),$

$(-15+x)^{12} (-13+x)^2 (5+x)^{54} \left(-291\,736 + 122\,033\,x - 20\,024\,x^2 + 1614\,x^3 - 64\,x^4 + x^5\right),$

$(-15 + x)^{12} \, (-13 + x)^3 \, (5 + x)^{54} \, \left(22\,324 - 7657\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-15 + x)^{12} \, (-13 + x)^3 \, (5 + x)^{54} \, \left(22\,340 - 7657\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-15 + x)^{12} \, (-13 + x)^3 \, (5 + x)^{54} \, \left(22\,356 - 7657\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-17 + x) \, (-15 + x)^{12} \, (-13 + x)^3 \, (5 + x)^{54} \, \left(-1316 + 373\,x - 34\,x^2 + x^3\right),$

$(-15 + x)^{12} \, (-13 + x)^2 \, (5 + x)^{54} \, \left(-291\,076 + 121\,929\,x - 20\,020\,x^2 + 1614\,x^3 - 64\,x^4 + x^5\right),$

$(-15 + x)^{12} \, (-13 + x)^3 \, (5 + x)^{54} \, \left(22\,272 - 7653\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-15 + x)^{12} \, (-13 + x)^3 \, (5 + x)^{54} \, \left(22\,288 - 7653\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-17 + x) \, (-15 + x)^{12} \, (-13 + x)^3 \, (5 + x)^{54} \, \left(-1312 + 373\,x - 34\,x^2 + x^3\right),$

$(-15 + x)^{13} \, (-13 + x)^3 \, (5 + x)^{54} \, \left(-1488 + 411\,x - 36\,x^2 + x^3\right),$

$(-15 + x)^{13} \, (-13 + x)^2 \, (-11 + x) \, (5 + x)^{54} \, \left(-1760 + 461\,x - 38\,x^2 + x^3\right),$

$(-15 + x)^{12} \, (-13 + x)^2 \, (5 + x)^{54} \, \left(-289\,292 + 121\,689\,x - 20\,012\,x^2 + 1614\,x^3 - 64\,x^4 + x^5\right),$

$(-15 + x)^{13} \, (-13 + x)^2 \, (5 + x)^{54} \, \left(19\,300 - 6827\,x + 879\,x^2 - 49\,x^3 + x^4\right),$

$(-15 + x)^{12} \, (-13 + x)^2 \, (5 + x)^{54} \, \left(-288\,616 + 121\,585\,x - 20\,008\,x^2 + 1614\,x^3 - 64\,x^4 + x^5\right),$

$(-17 + x) \, (-15 + x)^{12} \, (-13 + x)^4 \, (5 + x)^{54} \, \left(100 - 21\,x + x^2\right),$

$(-15 + x)^{12} \, (-13 + x)^3 \, (5 + x)^{54} \, \left(22\,116 - 7641\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-15 + x)^{12} \, (-13 + x)^3 \, (5 + x)^{54} \, \left(22\,132 - 7641\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-15 + x)^{12} \, (-13 + x)^4 \, (5 + x)^{54} \, \left(-1696 + 457\,x - 38\,x^2 + x^3\right),$

$(-15 + x)^{12} \, (-13 + x)^3 \, (5 + x)^{54} \, \left(22\,064 - 7637\,x + 951\,x^2 - 51\,x^3 + x^4\right),$

$(-15 + x)^{13} \, (-13 + x)^3 \, (5 + x)^{54} \, \left(-1472 + 411\,x - 36\,x^2 + x^3\right),$

$(-15 + x)^{13} \, (-13 + x)^2 \, (-12 + x) \, (5 + x)^{54} \, \left(-1591 + 435\,x - 37\,x^2 + x^3\right),$

$(-15 + x)^{12} \, (-13 + x)^4 \, (5 + x)^{54} \, \left(-1684 + 457\,x - 38\,x^2 + x^3\right),$

$(-16 + x) \, (-15 + x)^{13} \, (-13 + x)^4 \, (-7 + x) \, (5 + x)^{54}\}$

Length[listmod32]

60

CoefficientList[listmod32 / mu[chiwarrant] // Factor, x]

$\{\{-296\,036, 122\,729, -20\,052, 1614, -64, 1\},$

$\{-296\,244, 122\,745, -20\,052, 1614, -64, 1\},$

$\{-295\,152, 122\,609, -20\,048, 1614, -64, 1\},$

$\{-295\,360, 122\,625, -20\,048, 1614, -64, 1\},$

$\{-295\,568, 122\,641, -20\,048, 1614, -64, 1\},$

$\{-295\,776, 122\,657, -20\,048, 1614, -64, 1\},$

$\{-294\,908, 122\,537, -20\,044, 1614, -64, 1\},$

$\{-295\,116, 122\,553, -20\,044, 1614, -64, 1\},$

$\{-295\,324, 122\,569, -20\,044, 1614, -64, 1\},$

$\{-294\,232, 122\,433, -20\,040, 1614, -64, 1\},$

$\{-294\,440, 122\,449, -20\,040, 1614, -64, 1\},$

$\{-294\,648, 122\,465, -20\,040, 1614, -64, 1\},$

$\{-292\,916, 122\,281, -20\,036, 1614, -64, 1\},$

$\{-293\,124, 122\,297, -20\,036, 1614, -64, 1\},$

$\{-293\,332, 122\,313, -20\,036, 1614, -64, 1\},$

$\{-293\,540, 122\,329, -20\,036, 1614, -64, 1\},$

$\{-293\,780, 122\,345, -20\,036, 1614, -64, 1\},$

$\{-293\,748, 122\,345, -20\,036, 1614, -64, 1\},$

```
{-293 988, 122 361, -20 036, 1614, -64, 1},
{-293 956, 122 361, -20 036, 1614, -64, 1},
{-294 196, 122 377, -20 036, 1614, -64, 1},
{-292 240, 122 177, -20 032, 1614, -64, 1},
{-292 448, 122 193, -20 032, 1614, -64, 1},
{-292 656, 122 209, -20 032, 1614, -64, 1},
{-292 864, 122 225, -20 032, 1614, -64, 1},
{-293 104, 122 241, -20 032, 1614, -64, 1},
{-293 072, 122 241, -20 032, 1614, -64, 1},
{-293 312, 122 257, -20 032, 1614, -64, 1},
{-293 280, 122 257, -20 032, 1614, -64, 1},
{-293 520, 122 273, -20 032, 1614, -64, 1},
{-291 996, 122 105, -20 028, 1614, -64, 1},
{-292 204, 122 121, -20 028, 1614, -64, 1},
{-292 412, 122 137, -20 028, 1614, -64, 1},
{-292 620, 122 153, -20 028, 1614, -64, 1},
{-292 860, 122 169, -20 028, 1614, -64, 1},
{-291 320, 122 001, -20 024, 1614, -64, 1},
{-291 528, 122 017, -20 024, 1614, -64, 1},
{-291 736, 122 033, -20 024, 1614, -64, 1},
{-290 212, 121 865, -20 020, 1614, -64, 1},
{-290 420, 121 881, -20 020, 1614, -64, 1},
{-290 628, 121 897, -20 020, 1614, -64, 1},
{-290 836, 121 913, -20 020, 1614, -64, 1},
{-291 076, 121 929, -20 020, 1614, -64, 1},
{-289 536, 121 761, -20 016, 1614, -64, 1},
{-289 744, 121 777, -20 016, 1614, -64, 1},
{-289 952, 121 793, -20 016, 1614, -64, 1},
{-290 160, 121 809, -20 016, 1614, -64, 1},
{-290 400, 121 825, -20 016, 1614, -64, 1},
{-289 292, 121 689, -20 012, 1614, -64, 1},
{-289 500, 121 705, -20 012, 1614, -64, 1},
{-288 616, 121 585, -20 008, 1614, -64, 1},
{-287 300, 121 433, -20 004, 1614, -64, 1},
{-287 508, 121 449, -20 004, 1614, -64, 1},
{-287 716, 121 465, -20 004, 1614, -64, 1},
{-286 624, 121 329, -20 000, 1614, -64, 1},
{-286 832, 121 345, -20 000, 1614, -64, 1},
{-287 040, 121 361, -20 000, 1614, -64, 1},
{-286 380, 121 257, -19 996, 1614, -64, 1},
{-284 596, 121 017, -19 988, 1614, -64, 1},
{-283 920, 120 913, -19 984, 1614, -64, 1}}
```

```
A1 = {{-296 036, 122 729, -20 052, 1614, -64, 1}, {-296 244, 122 745,
    -20 052, 1614, -64, 1}, {-295 152, 122 609, -20 048, 1614, -64, 1},
   {-295 360, 122 625, -20 048, 1614, -64, 1}, {-295 568, 122 641,
    -20 048, 1614, -64, 1}, {-295 776, 122 657, -20 048, -64, 1},
   {-294 908, 122 537, -20 044, 1614, -64, 1}, {-295 116, 122 553,
    -20 044, 1614, -64, 1}, {-295 324, 122 569, -20 044, 1614, -64, 1},
   {-294 232, 122 433, -20 040, 1614, -64, 1}, {-294 440, 122 449,
    -20 040, 1614, -64, 1}, {-294 648, 122 465, -20 040, 1614, -64, 1},
   {-292 916, 122 281, -20 036, 1614, -64, 1}, {-293 124, 122 297,
    -20 036, 1614, -64, 1}, {-293 332, 122 313, -20 036, 1614, -64, 1},
   {-293 540, 122 329, -20 036, 1614, -64, 1}, {-293 780, 122 345,
    -20 036, 1614, -64, 1}, {-293 748, 122 345, -20 036, 1614, -64, 1},
   {-293 988, 122 361, -20 036, 1614, -64, 1}, {-293 956, 122 361,
    -20 036, 1614, -64, 1}, {-294 196, 122 377, -20 036, 1614, -64, 1},
   {-292 240, 122 177, -20 032, 1614, -64, 1}, {-292 448, 122 193,
    -20 032, 1614, -64, 1}, {-292 656, 122 209, -20 032, 1614, -64, 1},
   {-292 864, 122 225, -20 032, 1614, -64, 1}, {-293 104, 122 241,
    -20 032, 1614, -64, 1}, {-293 072, 122 241, -20 032, 1614, -64, 1},
   {-293 312, 122 257, -20 032, 1614, -64, 1}, {-293 280, 122 257,
    -20 032, 1614, -64, 1}, {-293 520, 122 273, -20 032, 1614, -64, 1},
   {-291 996, 122 105, -20 028, 1614, -64, 1}, {-292 204, 122 121,
    -20 028, 1614, -64, 1}, {-292 412, 122 137, -20 028, 1614, -64, 1},
   {-292 620, 122 153, -20 028, 1614, -64, 1}, {-292 860, 122 169,
    -20 028, 1614, -64, 1}, {-291 320, 122 001, -20 024, 1614, -64, 1},
   {-291 528, 122 017, -20 024, 1614, -64, 1}, {-291 736, 122 033,
    -20 024, 1614, -64, 1}, {-290 212, 121 865, -20 020, 1614, -64, 1},
   {-290 420, 121 881, -20 020, 1614, -64, 1}, {-290 628, 121 897,
    -20 020, 1614, -64, 1}, {-290 836, 121 913, -20 020, 1614, -64, 1},
   {-291 076, 121 929, -20 020, 1614, -64, 1}, {-289 536, 121 761,
    -20 016, 1614, -64, 1}, {-289 744, 121 777, -20 016, 1614, -64, 1},
   {-289 952, 121 793, -20 016, 1614, -64, 1}, {-290 160, 121 809,
    -20 016, 1614, -64, 1}, {-290 400, 121 825, -20 016, 1614, -64, 1},
   {-289 292, 121 689, -20 012, 1614, -64, 1}, {-289 500, 121 705,
    -20 012, 1614, -64, 1}, {-288 616, 121 585, -20 008, 1614, -64, 1},
   {-287 300, 121 433, -20 004, 1614, -64, 1}, {-287 508, 121 449,
    -20 004, 1614, -64, 1}, {-287 716, 121 465, -20 004, 1614, -64, 1},
   {-286 624, 121 329, -20 000, 1614, -64, 1}, {-286 832, 121 345,
    -20 000, 1614, -64, 1}, {-287 040, 121 361, -20 000, 1614, -64, 1},
   {-286 380, 121 257, -19 996, 1614, -64, 1}, {-284 596, 121 017, -19 988,
    1614, -64, 1}, {-283 920, 120 913, -19 984, 1614, -64, 1}};

A1 // MatrixForm
```

$$\begin{pmatrix}
-296\,036 & 122\,729 & -20\,052 & 1614 & -64 & 1 \\
-296\,244 & 122\,745 & -20\,052 & 1614 & -64 & 1 \\
-295\,152 & 122\,609 & -20\,048 & 1614 & -64 & 1 \\
-295\,360 & 122\,625 & -20\,048 & 1614 & -64 & 1 \\
-295\,568 & 122\,641 & -20\,048 & 1614 & -64 & 1 \\
-295\,776 & 122\,657 & -20\,048 & 1614 & -64 & 1 \\
-294\,908 & 122\,537 & -20\,044 & 1614 & -64 & 1
\end{pmatrix}$$

$$\begin{pmatrix}
-294\,908 & 122\,537 & -20\,044 & 1614 & -64 & 1 \\
-295\,116 & 122\,553 & -20\,044 & 1614 & -64 & 1 \\
-295\,324 & 122\,569 & -20\,044 & 1614 & -64 & 1 \\
-294\,232 & 122\,433 & -20\,040 & 1614 & -64 & 1 \\
-294\,440 & 122\,449 & -20\,040 & 1614 & -64 & 1 \\
-294\,648 & 122\,465 & -20\,040 & 1614 & -64 & 1 \\
-292\,916 & 122\,281 & -20\,036 & 1614 & -64 & 1 \\
-293\,124 & 122\,297 & -20\,036 & 1614 & -64 & 1 \\
-293\,332 & 122\,313 & -20\,036 & 1614 & -64 & 1 \\
-293\,540 & 122\,329 & -20\,036 & 1614 & -64 & 1 \\
-293\,780 & 122\,345 & -20\,036 & 1614 & -64 & 1 \\
-293\,748 & 122\,345 & -20\,036 & 1614 & -64 & 1 \\
-293\,988 & 122\,361 & -20\,036 & 1614 & -64 & 1 \\
-293\,956 & 122\,361 & -20\,036 & 1614 & -64 & 1 \\
-294\,196 & 122\,377 & -20\,036 & 1614 & -64 & 1 \\
-292\,240 & 122\,177 & -20\,032 & 1614 & -64 & 1 \\
-292\,448 & 122\,193 & -20\,032 & 1614 & -64 & 1 \\
-292\,656 & 122\,209 & -20\,032 & 1614 & -64 & 1 \\
-292\,864 & 122\,225 & -20\,032 & 1614 & -64 & 1 \\
-293\,104 & 122\,241 & -20\,032 & 1614 & -64 & 1 \\
-293\,072 & 122\,241 & -20\,032 & 1614 & -64 & 1 \\
-293\,312 & 122\,257 & -20\,032 & 1614 & -64 & 1 \\
-293\,280 & 122\,257 & -20\,032 & 1614 & -64 & 1 \\
-293\,520 & 122\,273 & -20\,032 & 1614 & -64 & 1 \\
-291\,996 & 122\,105 & -20\,028 & 1614 & -64 & 1 \\
-292\,204 & 122\,121 & -20\,028 & 1614 & -64 & 1 \\
-292\,412 & 122\,137 & -20\,028 & 1614 & -64 & 1 \\
-292\,620 & 122\,153 & -20\,028 & 1614 & -64 & 1 \\
-292\,860 & 122\,169 & -20\,028 & 1614 & -64 & 1 \\
-291\,320 & 122\,001 & -20\,024 & 1614 & -64 & 1 \\
-291\,528 & 122\,017 & -20\,024 & 1614 & -64 & 1 \\
-291\,736 & 122\,033 & -20\,024 & 1614 & -64 & 1 \\
-290\,212 & 121\,865 & -20\,020 & 1614 & -64 & 1 \\
-290\,420 & 121\,881 & -20\,020 & 1614 & -64 & 1 \\
-290\,628 & 121\,897 & -20\,020 & 1614 & -64 & 1 \\
-290\,836 & 121\,913 & -20\,020 & 1614 & -64 & 1 \\
-291\,076 & 121\,929 & -20\,020 & 1614 & -64 & 1 \\
-289\,536 & 121\,761 & -20\,016 & 1614 & -64 & 1 \\
-289\,744 & 121\,777 & -20\,016 & 1614 & -64 & 1 \\
-289\,952 & 121\,793 & -20\,016 & 1614 & -64 & 1 \\
-290\,160 & 121\,809 & -20\,016 & 1614 & -64 & 1 \\
-290\,400 & 121\,825 & -20\,016 & 1614 & -64 & 1 \\
-289\,292 & 121\,689 & -20\,012 & 1614 & -64 & 1 \\
-289\,500 & 121\,705 & -20\,012 & 1614 & -64 & 1 \\
-288\,616 & 121\,585 & -20\,008 & 1614 & -64 & 1 \\
-287\,300 & 121\,433 & -20\,004 & 1614 & -64 & 1 \\
-287\,508 & 121\,449 & -20\,004 & 1614 & -64 & 1 \\
-287\,716 & 121\,465 & -20\,004 & 1614 & -64 & 1 \\
-286\,624 & 121\,329 & -20\,000 & 1614 & -64 & 1 \\
-286\,832 & 121\,345 & -20\,000 & 1614 & -64 & 1 \\
-287\,040 & 121\,361 & -20\,000 & 1614 & -64 & 1 \\
-286\,380 & 121\,257 & -19\,996 & 1614 & -64 & 1 \\
-284\,596 & 121\,017 & -19\,988 & 1614 & -64 & 1 \\
-283\,920 & 120\,913 & -19\,984 & 1614 & -64 & 1
\end{pmatrix}$$

```
g1 = CoefficientList[D[chiwarrant, x] / mu[chiwarrant] // Factor, x]
```

$\{-21\,860\,520,\ 9\,074\,586,\ -1\,483\,560,\ 119\,436,\ -4736,\ 74\}$

```
Array[c, 6].Transpose[A1]
```

$\{-296\,036\,c[1] + 122\,729\,c[2] - 20\,052\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-296\,244\,c[1] + 122\,745\,c[2] - 20\,052\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-295\,152\,c[1] + 122\,609\,c[2] - 20\,048\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-295\,360\,c[1] + 122\,625\,c[2] - 20\,048\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-295\,568\,c[1] + 122\,641\,c[2] - 20\,048\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-295\,776\,c[1] + 122\,657\,c[2] - 20\,048\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-294\,908\,c[1] + 122\,537\,c[2] - 20\,044\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-295\,116\,c[1] + 122\,553\,c[2] - 20\,044\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-295\,324\,c[1] + 122\,569\,c[2] - 20\,044\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-294\,232\,c[1] + 122\,433\,c[2] - 20\,040\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-294\,440\,c[1] + 122\,449\,c[2] - 20\,040\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-294\,648\,c[1] + 122\,465\,c[2] - 20\,040\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-292\,916\,c[1] + 122\,281\,c[2] - 20\,036\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-293\,124\,c[1] + 122\,297\,c[2] - 20\,036\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-293\,332\,c[1] + 122\,313\,c[2] - 20\,036\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-293\,540\,c[1] + 122\,329\,c[2] - 20\,036\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-293\,780\,c[1] + 122\,345\,c[2] - 20\,036\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-293\,748\,c[1] + 122\,345\,c[2] - 20\,036\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-293\,988\,c[1] + 122\,361\,c[2] - 20\,036\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-293\,956\,c[1] + 122\,361\,c[2] - 20\,036\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-294\,196\,c[1] + 122\,377\,c[2] - 20\,036\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-292\,240\,c[1] + 122\,177\,c[2] - 20\,032\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-292\,448\,c[1] + 122\,193\,c[2] - 20\,032\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-292\,656\,c[1] + 122\,209\,c[2] - 20\,032\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-292\,864\,c[1] + 122\,225\,c[2] - 20\,032\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-293\,104\,c[1] + 122\,241\,c[2] - 20\,032\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-293\,072\,c[1] + 122\,241\,c[2] - 20\,032\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-293\,312\,c[1] + 122\,257\,c[2] - 20\,032\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-293\,280\,c[1] + 122\,257\,c[2] - 20\,032\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-293\,520\,c[1] + 122\,273\,c[2] - 20\,032\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-291\,996\,c[1] + 122\,105\,c[2] - 20\,028\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-292\,204\,c[1] + 122\,121\,c[2] - 20\,028\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-292\,412\,c[1] + 122\,137\,c[2] - 20\,028\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-292\,620\,c[1] + 122\,153\,c[2] - 20\,028\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-292\,860\,c[1] + 122\,169\,c[2] - 20\,028\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-291\,320\,c[1] + 122\,001\,c[2] - 20\,024\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-291\,528\,c[1] + 122\,017\,c[2] - 20\,024\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-291\,736\,c[1] + 122\,033\,c[2] - 20\,024\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-290\,212\,c[1] + 121\,865\,c[2] - 20\,020\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-290\,420\,c[1] + 121\,881\,c[2] - 20\,020\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-290\,628\,c[1] + 121\,897\,c[2] - 20\,020\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-290\,836\,c[1] + 121\,913\,c[2] - 20\,020\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-291\,076\,c[1] + 121\,929\,c[2] - 20\,020\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$

$-289\,536\,c[1] + 121\,761\,c[2] - 20\,016\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-289\,744\,c[1] + 121\,777\,c[2] - 20\,016\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-289\,952\,c[1] + 121\,793\,c[2] - 20\,016\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-290\,160\,c[1] + 121\,809\,c[2] - 20\,016\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-290\,400\,c[1] + 121\,825\,c[2] - 20\,016\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-289\,292\,c[1] + 121\,689\,c[2] - 20\,012\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-289\,500\,c[1] + 121\,705\,c[2] - 20\,012\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-288\,616\,c[1] + 121\,585\,c[2] - 20\,008\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-287\,300\,c[1] + 121\,433\,c[2] - 20\,004\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-287\,508\,c[1] + 121\,449\,c[2] - 20\,004\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-287\,716\,c[1] + 121\,465\,c[2] - 20\,004\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-286\,624\,c[1] + 121\,329\,c[2] - 20\,000\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-286\,832\,c[1] + 121\,345\,c[2] - 20\,000\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-287\,040\,c[1] + 121\,361\,c[2] - 20\,000\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-286\,380\,c[1] + 121\,257\,c[2] - 19\,996\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-284\,596\,c[1] + 121\,017\,c[2] - 19\,988\,c[3] + 1614\,c[4] - 64\,c[5] + c[6],$
$-283\,920\,c[1] + 120\,913\,c[2] - 19\,984\,c[3] + 1614\,c[4] - 64\,c[5] + c[6]\}$

```
Array[c, 6].g1
```

$-21\,860\,520\,c[1] + 9\,074\,586\,c[2] - 1\,483\,560\,c[3] + 119\,436\,c[4] - 4736\,c[5] + 74\,c[6]$

```
cert1 = Flatten[Array[c, 6] /. FindInstance[
```

$-21\,860\,520\,c[1] + 9\,074\,586\,c[2] - 1\,483\,560\,c[3] + 119\,436\,c[4] - 4736\,c[5] + 74\,c[6] <$
$\quad 0 \;\&\&\; -296\,036\,c[1] + 122\,729\,c[2] - 20\,052\,c[3] + 1614\,c[4] - 64\,c[5] + c[6] \geq 0 \;\&\&$
$\quad -296\,244\,c[1] + 122\,745\,c[2] - 20\,052\,c[3] + 1614\,c[4] - 64\,c[5] + c[6] \geq 0 \;\&\&$
$\quad -295\,152\,c[1] + 122\,609\,c[2] - 20\,048\,c[3] + 1614\,c[4] - 64\,c[5] + c[6] \geq 0 \;\&\&$
$\quad -295\,360\,c[1] + 122\,625\,c[2] - 20\,048\,c[3] + 1614\,c[4] - 64\,c[5] + c[6] \geq 0 \;\&\&$
$\quad -295\,568\,c[1] + 122\,641\,c[2] - 20\,048\,c[3] + 1614\,c[4] - 64\,c[5] + c[6] \geq 0 \;\&\&$
$\quad -295\,776\,c[1] + 122\,657\,c[2] - 20\,048\,c[3] + 1614\,c[4] - 64\,c[5] + c[6] \geq 0 \;\&\&$
$\quad -294\,908\,c[1] + 122\,537\,c[2] - 20\,044\,c[3] + 1614\,c[4] - 64\,c[5] + c[6] \geq 0 \;\&\&$
$\quad -295\,116\,c[1] + 122\,553\,c[2] - 20\,044\,c[3] + 1614\,c[4] - 64\,c[5] + c[6] \geq 0 \;\&\&$
$\quad -295\,324\,c[1] + 122\,569\,c[2] - 20\,044\,c[3] + 1614\,c[4] - 64\,c[5] + c[6] \geq 0 \;\&\&$
$\quad -294\,232\,c[1] + 122\,433\,c[2] - 20\,040\,c[3] + 1614\,c[4] - 64\,c[5] + c[6] \geq 0 \;\&\&$
$\quad -294\,440\,c[1] + 122\,449\,c[2] - 20\,040\,c[3] + 1614\,c[4] - 64\,c[5] + c[6] \geq 0 \;\&\&$
$\quad -294\,648\,c[1] + 122\,465\,c[2] - 20\,040\,c[3] + 1614\,c[4] - 64\,c[5] + c[6] \geq 0 \;\&\&$
$\quad -292\,916\,c[1] + 122\,281\,c[2] - 20\,036\,c[3] + 1614\,c[4] - 64\,c[5] + c[6] \geq 0 \;\&\&$
$\quad -293\,124\,c[1] + 122\,297\,c[2] - 20\,036\,c[3] + 1614\,c[4] - 64\,c[5] + c[6] \geq 0 \;\&\&$
$\quad -293\,332\,c[1] + 122\,313\,c[2] - 20\,036\,c[3] + 1614\,c[4] - 64\,c[5] + c[6] \geq 0 \;\&\&$
$\quad -293\,540\,c[1] + 122\,329\,c[2] - 20\,036\,c[3] + 1614\,c[4] - 64\,c[5] + c[6] \geq 0 \;\&\&$
$\quad -293\,780\,c[1] + 122\,345\,c[2] - 20\,036\,c[3] + 1614\,c[4] - 64\,c[5] + c[6] \geq 0 \;\&\&$
$\quad -293\,748\,c[1] + 122\,345\,c[2] - 20\,036\,c[3] + 1614\,c[4] - 64\,c[5] + c[6] \geq 0 \;\&\&$
$\quad -293\,988\,c[1] + 122\,361\,c[2] - 20\,036\,c[3] + 1614\,c[4] - 64\,c[5] + c[6] \geq 0 \;\&\&$
$\quad -293\,956\,c[1] + 122\,361\,c[2] - 20\,036\,c[3] + 1614\,c[4] - 64\,c[5] + c[6] \geq 0 \;\&\&$
$\quad -294\,196\,c[1] + 122\,377\,c[2] - 20\,036\,c[3] + 1614\,c[4] - 64\,c[5] + c[6] \geq 0 \;\&\&$
$\quad -292\,240\,c[1] + 122\,177\,c[2] - 20\,032\,c[3] + 1614\,c[4] - 64\,c[5] + c[6] \geq 0 \;\&\&$
$\quad -292\,448\,c[1] + 122\,193\,c[2] - 20\,032\,c[3] + 1614\,c[4] - 64\,c[5] + c[6] \geq 0 \;\&\&$
$\quad -292\,656\,c[1] + 122\,209\,c[2] - 20\,032\,c[3] + 1614\,c[4] - 64\,c[5] + c[6] \geq 0 \;\&\&$

```
      - 292 864 c[1] + 122 225 c[2] - 20 032 c[3] + 1614 c[4] - 64 c[5] + c[6] ≥ 0 &&
      - 293 104 c[1] + 122 241 c[2] - 20 032 c[3] + 1614 c[4] - 64 c[5] + c[6] ≥ 0 &&
      - 293 072 c[1] + 122 241 c[2] - 20 032 c[3] + 1614 c[4] - 64 c[5] + c[6] ≥ 0 &&
      - 293 312 c[1] + 122 257 c[2] - 20 032 c[3] + 1614 c[4] - 64 c[5] + c[6] ≥ 0 &&
      - 293 280 c[1] + 122 257 c[2] - 20 032 c[3] + 1614 c[4] - 64 c[5] + c[6] ≥ 0 &&
      - 293 520 c[1] + 122 273 c[2] - 20 032 c[3] + 1614 c[4] - 64 c[5] + c[6] ≥ 0 &&
      - 291 996 c[1] + 122 105 c[2] - 20 028 c[3] + 1614 c[4] - 64 c[5] + c[6] ≥ 0 &&
      - 292 204 c[1] + 122 121 c[2] - 20 028 c[3] + 1614 c[4] - 64 c[5] + c[6] ≥ 0 &&
      - 292 412 c[1] + 122 137 c[2] - 20 028 c[3] + 1614 c[4] - 64 c[5] + c[6] ≥ 0 &&
      - 292 620 c[1] + 122 153 c[2] - 20 028 c[3] + 1614 c[4] - 64 c[5] + c[6] ≥ 0 &&
      - 292 860 c[1] + 122 169 c[2] - 20 028 c[3] + 1614 c[4] - 64 c[5] + c[6] ≥ 0 &&
      - 291 320 c[1] + 122 001 c[2] - 20 024 c[3] + 1614 c[4] - 64 c[5] + c[6] ≥ 0 &&
      - 291 528 c[1] + 122 017 c[2] - 20 024 c[3] + 1614 c[4] - 64 c[5] + c[6] ≥ 0 &&
      - 291 736 c[1] + 122 033 c[2] - 20 024 c[3] + 1614 c[4] - 64 c[5] + c[6] ≥ 0 &&
      - 290 212 c[1] + 121 865 c[2] - 20 020 c[3] + 1614 c[4] - 64 c[5] + c[6] ≥ 0 &&
      - 290 420 c[1] + 121 881 c[2] - 20 020 c[3] + 1614 c[4] - 64 c[5] + c[6] ≥ 0 &&
      - 290 628 c[1] + 121 897 c[2] - 20 020 c[3] + 1614 c[4] - 64 c[5] + c[6] ≥ 0 &&
      - 290 836 c[1] + 121 913 c[2] - 20 020 c[3] + 1614 c[4] - 64 c[5] + c[6] ≥ 0 &&
      - 291 076 c[1] + 121 929 c[2] - 20 020 c[3] + 1614 c[4] - 64 c[5] + c[6] ≥ 0 &&
      - 289 536 c[1] + 121 761 c[2] - 20 016 c[3] + 1614 c[4] - 64 c[5] + c[6] ≥ 0 &&
      - 289 744 c[1] + 121 777 c[2] - 20 016 c[3] + 1614 c[4] - 64 c[5] + c[6] ≥ 0 &&
      - 289 952 c[1] + 121 793 c[2] - 20 016 c[3] + 1614 c[4] - 64 c[5] + c[6] ≥ 0 &&
      - 290 160 c[1] + 121 809 c[2] - 20 016 c[3] + 1614 c[4] - 64 c[5] + c[6] ≥ 0 &&
      - 290 400 c[1] + 121 825 c[2] - 20 016 c[3] + 1614 c[4] - 64 c[5] + c[6] ≥ 0 &&
      - 289 292 c[1] + 121 689 c[2] - 20 012 c[3] + 1614 c[4] - 64 c[5] + c[6] ≥ 0 &&
      - 289 500 c[1] + 121 705 c[2] - 20 012 c[3] + 1614 c[4] - 64 c[5] + c[6] ≥ 0 &&
      - 288 616 c[1] + 121 585 c[2] - 20 008 c[3] + 1614 c[4] - 64 c[5] + c[6] ≥ 0 &&
      - 287 300 c[1] + 121 433 c[2] - 20 004 c[3] + 1614 c[4] - 64 c[5] + c[6] ≥ 0 &&
      - 287 508 c[1] + 121 449 c[2] - 20 004 c[3] + 1614 c[4] - 64 c[5] + c[6] ≥ 0 &&
      - 287 716 c[1] + 121 465 c[2] - 20 004 c[3] + 1614 c[4] - 64 c[5] + c[6] ≥ 0 &&
      - 286 624 c[1] + 121 329 c[2] - 20 000 c[3] + 1614 c[4] - 64 c[5] + c[6] ≥ 0 &&
      - 286 832 c[1] + 121 345 c[2] - 20 000 c[3] + 1614 c[4] - 64 c[5] + c[6] ≥ 0 &&
      - 287 040 c[1] + 121 361 c[2] - 20 000 c[3] + 1614 c[4] - 64 c[5] + c[6] ≥ 0 &&
      - 286 380 c[1] + 121 257 c[2] - 19 996 c[3] + 1614 c[4] - 64 c[5] + c[6] ≥ 0 &&
      - 284 596 c[1] + 121 017 c[2] - 19 988 c[3] + 1614 c[4] - 64 c[5] + c[6] ≥ 0 &&
      - 283 920 c[1] + 120 913 c[2] - 19 984 c[3] + 1614 c[4] - 64 c[5] + c[6] ≥ 0,
    Array[c, 6], Integers]]

{74 412, 992 163, 13 319 775, 0, 0, 167 349 752 760}

GCD[74 412, 992 163, 13 319 775, 0, 0, 167 349 752 760]

3

cert1 = cert1 / 3

{24 804, 330 721, 4 439 925, 0, 0, 55 783 250 920}

Reverse[cert1]

{55 783 250 920, 0, 0, 4 439 925, 330 721, 24 804}
```

cert1.g1

$-6\,746\,494$

cert1.Transpose[A1]

{55 485, 187 789, 55 401, 187 705, 320 009, 452 313, 55 365, 187 669, 319 973, 187 585,
 319 889, 452 193, 319 757, 452 061, 584 365, 716 669, 55 245, 848 973, 187 549,
 981 277, 319 853, 451 977, 584 281, 716 585, 848 889, 187 465, 981 193, 319 769,
 1 113 497, 452 073, 451 941, 584 245, 716 549, 848 853, 187 429, 584 161, 716 465,
 848 769, 848 637, 980 941, 1 113 245, 1 245 549, 584 125, 980 857, 1 113 161,
 1 245 465, 1 377 769, 716 345, 980 821, 1 113 125, 1 113 041, 1 245 213, 1 377 517,
 1 509 821, 1 377 433, 1 509 737, 1 642 041, 1 377 397, 1 774 093, 1 906 313}