In[401]:=
```
SimpSymbol[symbol_] := λ^StringCount[SymbolName[symbol], "x"]
```

In[402]:=
```
SimpSymbol[n134x25]
```

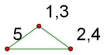
Out[402]= λ

In[403]:=
```
simpRep = Table[k → SimpSymbol[k], {k, realyNullAtomVars}]; Take[simpRep, 3]
```

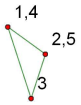
Out[403]= $\{\text{n1x2x3x4x5} \to \lambda^4, \text{n1x2x3x45} \to \lambda^3, \text{n1x2x35x4} \to \lambda^3\}$

In[414]:=
```
Table[allGraphs[k, "graph"] -> allGraphs[k, "colofourrealnull"],
  {k, {alfa1Key, beta1Key, gamma1Key, delta1Key, epsilon1Key}}] // TableForm
```

Out[414]//TableForm=

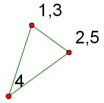


→ 2 n12345 − n1234x5 − n135x24 − n13x245 + n13x24x5

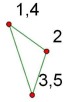


→ 2 n12345 − n1245x3 − n134x25 − n14x235 + n14x25x3

→ 2 n12345 − n124x35 − n135x24 − n1x2345 + n1x24x35



→ 2 n12345 − n1235x4 − n134x25 − n13x245 + n13x25x4



→ 2 n12345 − n124x35 − n1345x2 − n14x235 + n14x2x35

In[420]:=
```
Intersection[{n13x24x5, n12345, n1234x5, n135x24, n13x245},
 {n13x25x4, n12345, n1235x4, n134x25, n13x245}, {n14x25x3, n12345, n1245x3, n134x25, n14x235},
 {n14x2x35, n12345, n124x35, n1345x2, n14x235}, {n1x24x35, n12345, n124x35, n135x24, n1x2345}]
```

Out[420]= $\{\text{n12345}\}$

In[419]:=
```
Intersection[
 Table[ListofVars[allGraphs[k, "colofourrealnull"]], {k, {alfa1Key, beta1Key, gamma1Key, delta1Key, epsilon1Key}}]]
```

Out[419]=
```
{{n13x24x5, n12345, n1234x5, n135x24, n13x245},
 {n13x25x4, n12345, n1235x4, n134x25, n13x245}, {n14x25x3, n12345, n1245x3, n134x25, n14x235},
 {n14x2x35, n12345, n124x35, n1345x2, n14x235}, {n1x24x35, n12345, n124x35, n135x24, n1x2345}}
```

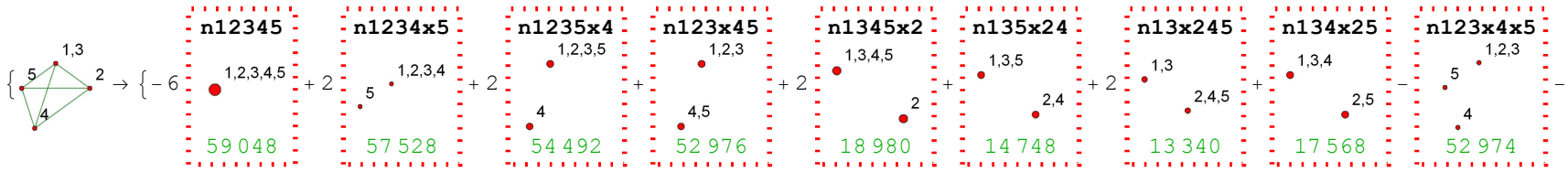
```
Intersection[{n123x45, n134x25, n135x24, n13x2x4x5, n12345, n1234x5,
  n1235x4, n123x4x5, n1345x2, n134x2x5, n135x2x4, n13x245, n13x24x5, n13x25x4, n13x2x45},
 {n124x35, n134x25, n145x23, n14x2x3x5, n12345, n1234x5, n1245x3, n124x3x5, n1345x2, n134x2x5,
  n145x2x3, n14x235, n14x23x5, n14x25x3, n14x2x35}, {n124x35, n13x245, n15x234, n1x24x3x5, n12345,
  n1234x5, n1245x3, n124x3x5, n135x24, n13x24x5, n15x24x3, n1x2345, n1x234x5, n1x245x3, n1x24x35},
 {n125x34, n13x245, n14x235, n1x25x3x4, n12345, n1235x4, n1245x3, n125x3x4, n134x25, n13x25x4,
  n14x25x3, n1x2345, n1x235x4, n1x245x3, n1x25x34}, {n12x345, n135x24, n14x235, n1x2x35x4, n12345,
  n1235x4, n124x35, n12x35x4, n1345x2, n135x2x4, n14x2x35, n1x2345, n1x235x4, n1x24x35, n1x2x345}]
```

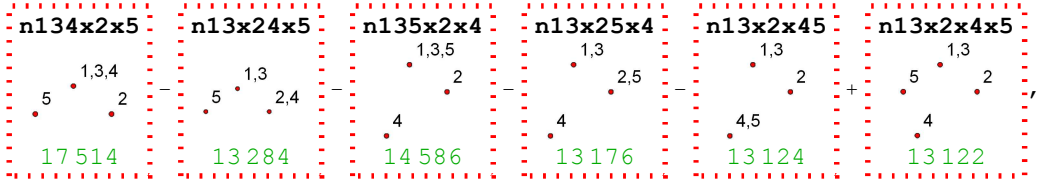
```
Intersection[
 Table[ListofVars[allGraphs[k, "colofourrealnull"]], {k, {quad1Key, quad2Key, quad3Key, quad4Key, quad5Key}}]]
```

```
Table[allGraphs[k, "graph"] →
  {allGraphs[k, "colofourrealnull"] /. repcolofourrealnullgraph2, allGraphs[k, "colofourrealnull"]},
 {k, {quad1Key, quad2Key, quad3Key, quad4Key, quad5Key}}]
```

In[536]:=
```
Table[allGraphs[k, "graph"] →
  {allGraphs[k, "colofourrealnull"] /. repcolofourrealnullgraph2, allGraphs[k, "colofourrealnull"]},
 {k, {quad1Key, quad2Key, quad3Key, quad4Key, quad5Key}}]
```

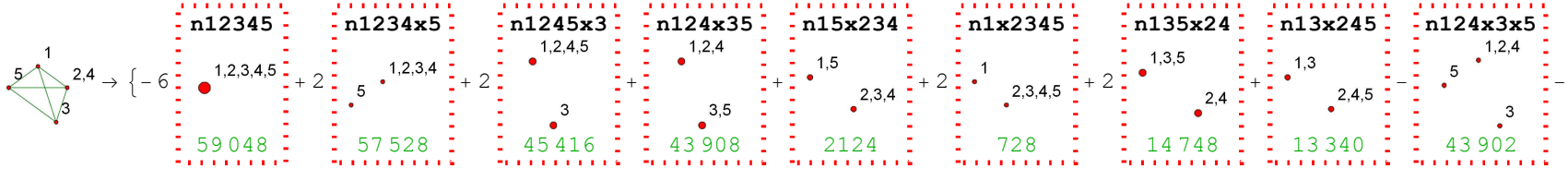
Out[536]=

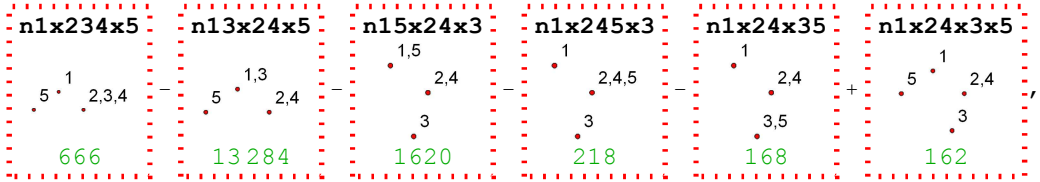




, −6 n12345 + 2 n1234x5 + 2 n1235x4 + n123x45 −

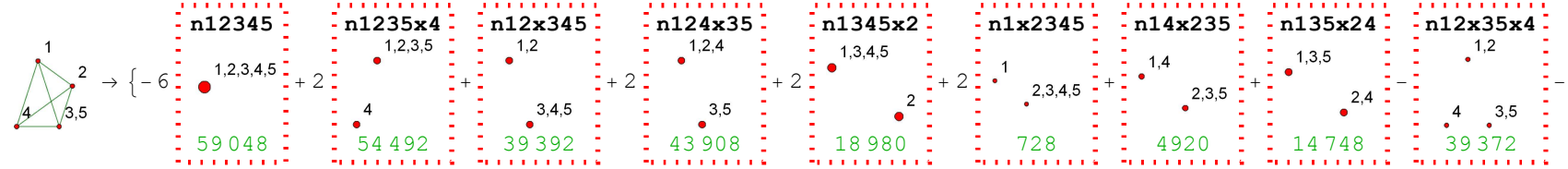
n123x4x5 + 2 n1345x2 + n134x25 − n134x2x5 + n135x24 − n135x2x4 + 2 n13x245 − n13x24x5 − n13x25x4 − n13x2x45 + n13x2x4x5},

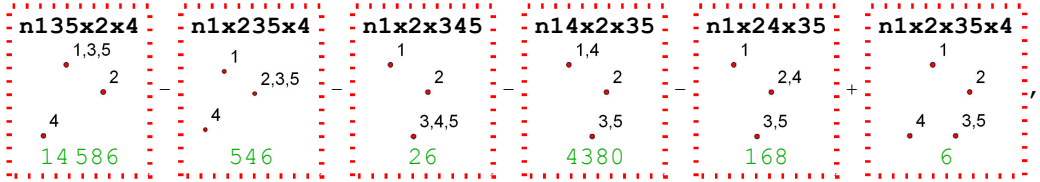




, −6 n12345 + 2 n1234x5 + 2 n1245x3 + n124x35 −

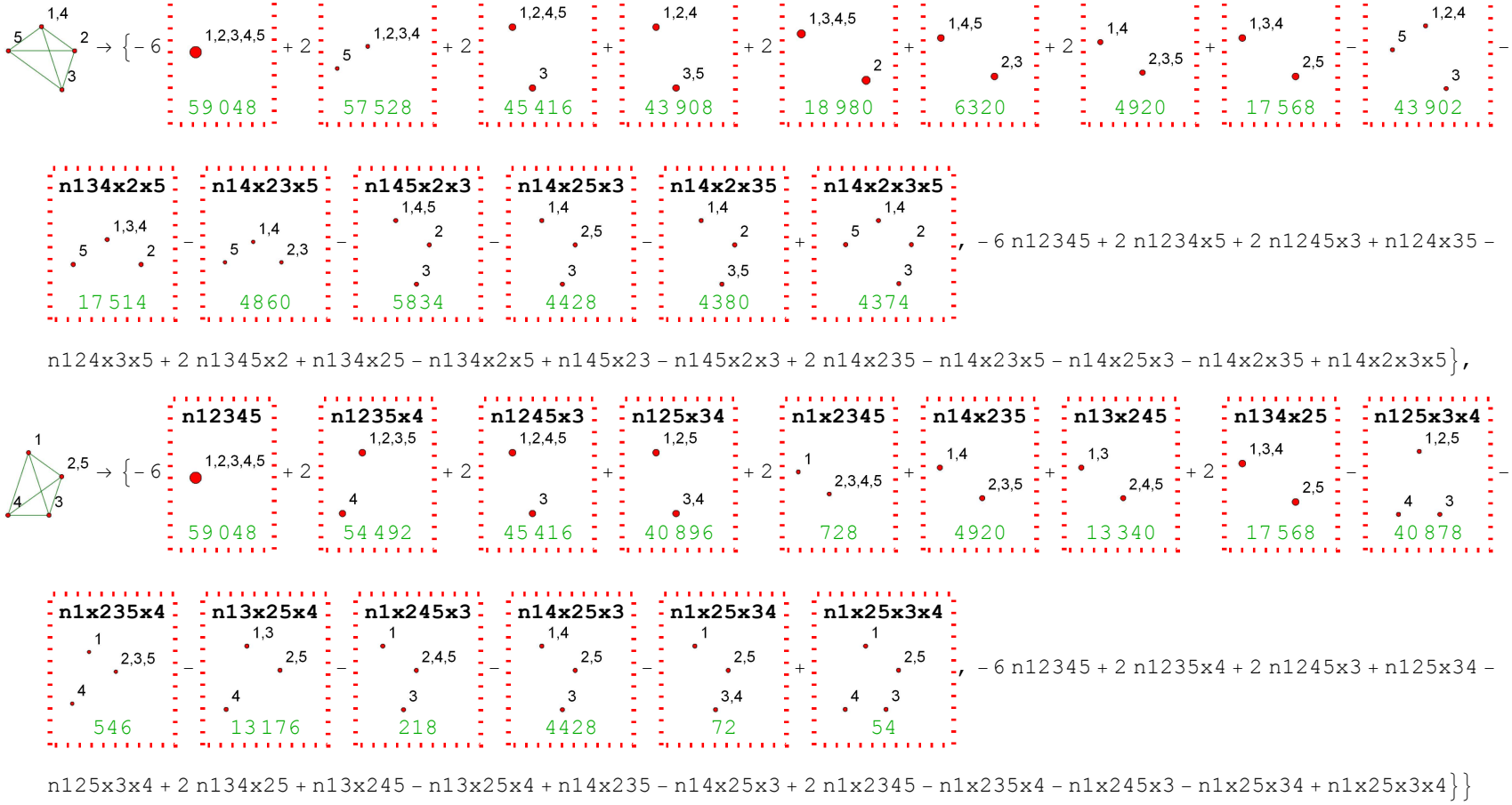
n124x3x5 + 2 n135x24 + n13x245 − n13x24x5 + n15x234 − n15x24x3 + 2 n1x2345 − n1x234x5 − n1x245x3 − n1x24x35 + n1x24x3x5},





, −6 n12345 + 2 n1235x4 + 2 n124x35 + n12x345 −

n12x35x4 + 2 n1345x2 + n135x24 − n135x2x4 + n14x235 − n14x2x35 + 2 n1x2345 − n1x235x4 − n1x24x35 − n1x2x345 + n1x2x35x4},

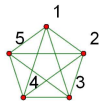


In[408]:= **ChromaticPolynomial[allGraphs[alfa1Key, "graph"], x]**

Out[408]= $2\,x - 3\,x^2 + x^3$

In[421]:= **Select[Keys[allGraphs], allGraphs[#, "colofourrealnull"] == n12345 &]**

Out[421]= {59 048}

In[424]:=
```
allGraphs[k5Key, "graph"]
```

Out[424]=