

Pensieve header: Testing the permutations package.

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SetDirectory[
  "C:\\drorbn\\AcademicPensieve\\Classes\\16-1750-ShamelessMathematica"];
Get["160330-PermutationsPackage.m"]
```

? Permutation

Permutation[i1,i2,...] represents a permutation mapping 1->i1, 2->i2, ...

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n = 54;
Y1 = Permutation[18, 27, 36, 4, 5, 6, 7, 8, 9, 3, 11, 12, 13, 14, 15, 16, 17, 45, 2, 20, 21, 22, 23, 24, 25, 26,
  44, 1, 29, 30, 31, 32, 33, 34, 35, 43, 37, 38, 39, 40, 41, 42, 10, 19, 28, 52, 49, 46, 53, 50, 47, 54, 51, 48];
Y2 = Permutation[1, 2, 3, 4, 5, 6, 16, 25, 34, 10, 11, 9, 15, 24, 33, 39, 17, 18, 19, 20, 8, 14, 23, 32, 38, 26,
  27, 28, 29, 7, 13, 22, 31, 37, 35, 36, 12, 21, 30, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54];
Y3 = Permutation[1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27,
  31, 32, 33, 34, 35, 36, 48, 47, 46, 39, 42, 45, 38, 41, 44, 37, 40, 43, 30, 29, 28, 49, 50, 51, 52, 53, 54];
Y4 = Permutation[3, 6, 9, 2, 5, 8, 1, 4, 7, 54, 53, 52, 10, 11, 12, 13, 14, 15, 19, 20, 21, 22, 23, 24, 25, 26, 27,
  28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 18, 17, 16];
Y5 = Permutation[13, 2, 3, 22, 5, 6, 31, 8, 9, 12, 21, 30, 37, 14, 15, 16, 17, 18, 11, 20, 29, 40, 23, 24, 25, 26,
  27, 10, 19, 28, 43, 32, 33, 34, 35, 36, 46, 38, 39, 49, 41, 42, 52, 44, 45, 1, 47, 48, 4, 50, 51, 7, 53, 54];
Y6 = Permutation[1, 2, 48, 4, 5, 51, 7, 8, 54, 10, 11, 12, 13, 14, 3, 18, 27, 36, 19, 20, 21, 22, 23, 6, 17, 26,
  35, 28, 29, 30, 31, 32, 9, 16, 25, 34, 37, 38, 15, 40, 41, 24, 43, 44, 33, 46, 47, 39, 49, 50, 42, 52, 53, 45];

$RecursionLimit = ∞; σ_ ∘ τ_ := PermutationProduct[τ, σ];
Feed[Permutation@@Range[n]] := Null;
Feed[τ_] := Module[{i, j, k, l},
  i = Min[PermutationSupport[τ]]; j = τ[[i]];
  If[Head[σ_{i,j}] === Permutation,
    Feed[InversePermutation[σ_{i,j}] ∘ τ],
    (*Else*) σ_{i,j} = τ;
  For[k = 1, k < n, ++k, For[l = k + 1, l ≤ n, ++l,
    If[Head[σ_{k,l}] === Permutation, Feed[σ_{i,j} ∘ σ_{k,l}]; Feed[σ_{k,l} ∘ σ_{i,j}]]
  ]];
];

Table[Feed[γ_α];
  ∏_{i=1}^n (1 + Count[Range[n], j_ /; Head[σ_{i,j}] == Permutation]), {α, 6}] // Timing
{92.8594, {4, 16, 159 993 501 696 000, 21 119 142 223 872 000,
  43 252 003 274 489 856 000, 43 252 003 274 489 856 000}}
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