Problem 53

There are exactly ten ways of selecting three from five, 12345:

123, 124, 125, 134, 135, 145, 234, 235, 245, and 345

It is not until n = 23, that a value exceeds one-million: 23C10 = 1144066.

How many, not necessarily distinct, values of nCr, for 1 n 100, are greater than one-million?

Solution

We make a table of “nCr if it’s less than a million, and ∞ otherwise”. In a less forgiving language, I would use 0 and make an operation ⊕ such that 0⊕b = 0.

In[120]:=
```
Clear[binomials];
binomials[0] = {1};
binomials[1] = {1, 1};
binomials[row_] := binomials[row] = Join[{1},
   ListConvolve[{1, 1}, binomials[row - 1]] /. n_Integer? (# > 1 000 000 &) → ∞, {1}]
```

In[124]:=
```
Count[binomials /@ Range[100], ∞, 2]
```

Out[124]=
```
4075
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