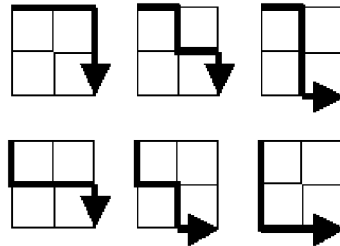


Lattice paths

Problem 15

Starting in the top left corner of a 2×2 grid, and only being able to move to the right and down, there are exactly 6 routes to the bottom right corner.



How many such routes are there through a 20×20 grid?

Solution 1

```
In [1]: from scipy.special import comb

N = 20

print(sum(comb(N, k, exact = True)**2 for k in range(N+1)))
137846528820
```

Solution 2

Oneliner

No **scipy** but less efficient.

```
In [2]: print(sum(z*z for z in (sum(bin(v).count('1') == x for v in range(2**20)) for x in range(20))))
137846528820
```

Solutions 3 and 4

More effective solutions.

With **scipy**:

```
In [3]: from scipy.special import comb

N = 20

print(comb(2 * N, N, exact = True))
137846528820
```

Without **scipy**:

```
In [4]: from functools import reduce
print(reduce(int_mul, range(N + 1 - 2 * N + 1)) // reduce(int_mul, range(1
137846528820
```