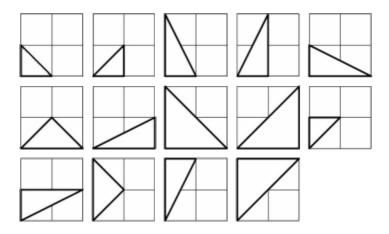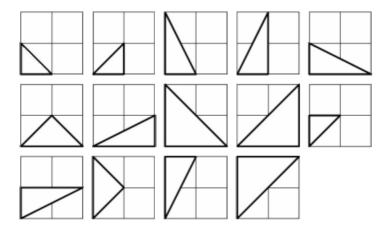# Right triangles with integer coordinates

Problem 91 (http://projecteuler.net/problem=91)

The points $P(x_1, y_1)$ and $Q(x_2, y_2)$ are plotted at integer co-ordinates and are joined to the origin, $O(0, 0)$, to form $\triangle OPQ$.

There are exactly fourteen triangles containing a right angle that can be formed when each co-ordinate lies between 0 and 2 inclusive; that is, $0 \le x_1, y_1, x_2, y_2 \le 2$.

Given that $0 \le x_1, y_1, x_2, y_2 \le 50$, how many right triangles can be formed?

Solution

```python
from itertools import combinations

N = 51

rights = 0
#l = []

for dots in combinations(range(1, N * N ), 2):
    triangle = []
    for x in dots:
        triangle.append((x % N, x // N))
    qsides = [
        (triangle[0][0] - triangle[1][0]) ** 2 + (triangle[0][1] - triangle
        triangle[0][0] ** 2 + triangle[0][1] ** 2,
        triangle[1][0] ** 2 + triangle[1][1] ** 2,
    ]
    if sum(qsides) == 2 * max(qsides):
        rights += 1
#        l.append((dots, triangle, qsides))

print(rights)
#from pprint import pprint
#pprint(l)
```

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