Points: 60

This is a skills practice assignment. You can practice skills needed for programming homeworks later. This will also tell me where people are in the class. Finally, it will give you practice submitting homework to the test system. Hope you find the problem fun.

Walking to School

I lived in Tucson, Arizona when I was working on my Masters degree. My apartment was 7 blocks West and 5 blocks North of the CS building, which was on the edge of campus. The streets were laid out in a grid, so there were many ways I could walk to school. I could walk 7 blocks East and 5 blocks South or I could walk 6 blocks East then 4 blocks South then 1 block East and then 1 block South etc. As I was walking to school one day, I wondered how many ways there were, provided I didn't overshoot the CS building and always made progress toward the building. It didn't take long to deduce that there were, in fact, 792 ways. I could walk to and from school a different way every day of the year!

At the time I thought it would be nice to have a table for future living locations that showed the number of ways to walk to work if you lived in a town with streets laid out in a grid and work was S blocks South and E blocks East of where you lived. Let's call the function that determines the number of ways: $w(S, E)$.

It is clear that for this problem:
$w(0, E) = 1 \ \forall \ E \geq 0$
$w(S, 0) = 1 \ \forall \ S \geq 0$
$w(S, E) = w(S - 1, E) + w(S, E - 1) \ \forall \ S, E > 0$.

Write a python3 program to compute a table of the number of ways to walk to work up to 12 blocks by 12 blocks. For this exercise you must use an 2D array and **dynamic programming** to solve the problem by first correctly filling in the 13×13 array using dynamic programming and then printing it. It should look something like this (ignoring the lines that have been inserted in this description for clarity):

S/E	0	1	2	3	4	5	6	7	8	9	10	11	12
0	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	2	3	4	5	6	7	8	9	10	11	12	13
2	1	3	6	10	15	21	28	36	45	55	66	78	91
3	1	4	10	20	35	56	84	120	165	220	286	364	455
4	1	5	15	35	70	126	210	330	495	715	1001	1365	1820
5	1	6	21	56	126	252	462	792	1287	2002	3003	4368	6188
6	1	7	28	84	210	462	924	1716	3003	5005	8008	12376	18564
7	1	8	36	120	330	792	1716	3432	6435	11440	19448	31824	50388
8	1	9	45	165	495	1287	3003	6435	12870	24310	43758	75582	125970
9	1	10	55	220	715	2002	5005	11440	24310	48620	92378	167960	293930
10	1	11	66	286	1001	3003	8008	19448	43758	92378	184756	352716	646646
11	1	12	78	364	1365	4368	12376	31824	75582	167960	352716	705432	1352078
12	1	13	91	455	1820	6188	18564	50388	125970	293930	646646	1352078	2704156

Submit a single file named `walk.py` to the class submission page. The test script will ignore the spacing you choose and focus numbers. They should be integers. Remember no late papers and so always turn something in for partial credit.