Question 01

The Lost Temple of Angkor

Background

The Lost Temple of Angkor has been hidden for centuries, with stories of incredible treasures hidden deep within its ancient walls. Recently, explorers have unearthed a map that reveals a secret grid of numbers inscribed on the temple's stone floor. These numbers are believed to hold the key to finding the greatest treasure in the temple.

As an expert cryptographer, you have been tasked with deciphering the map to determine the location of the treasure. The map contains a 20x20 grid of numbers. Hidden within this grid are sequences of four adjacent numbers in various directions—horizontal, vertical, and diagonal. The key to unlocking the temple's secrets lies in finding the greatest product of four adjacent numbers.

Problem Statement

Given a 20x20 grid of numbers, your task is to find the largest product of four adjacent numbers in the same direction (horizontally, vertically, or diagonally). You must consider all possible sequences of four adjacent numbers and calculate their product. Your objective is to determine the maximum product among all possible sequences.

Input

The 20x20 grid is as follows:

08	02	22	97	38	15	00	40	00	75	04	05	07	78	52	12	50	77	91	08
49	49	99	40	17	81	18	57	60	87	17	40	98	43	69	48	04	56	62	00
81	49	31	73	55	79	14	29	93	71	40	67	53	88	30	03	49	13	36	65
52	70	95	23	04	60	11	42	69	24	68	56	01	32	56	71	37	02	36	91
22	31	16	71	51	67	63	89	41	92	36	54	22	40	40	28	66	33	13	80
24	47	32	60	99	03	45	02	44	75	33	53	78	36	84	20	35	17	12	50
32	98	81	28	64	23	67	10	26	38	40	67	59	54	70	66	18	38	64	70
67	26	20	68	02	62	12	20	95	63	94	39	63	08	40	91	66	49	94	21
24	55	58	05	66	73	99	26	97	17	78	78	96	83	14	88	34	89	63	72
21	36	23	09	75	00	76	44	20	45	35	14	00	61	33	97	34	31	33	95
78	17	53	28	22	75	31	67	15	94	03	80	04	62	16	14	09	53	56	92
16	39	05	42	96	35	31	47	55	58	88	24	00	17	54	24	36	29	85	57
86	56	00	48	35	71	89	07	05	44	44	37	44	60	21	58	51	54	17	58
19	80	81	68	05	94	47	69	28	73	92	13	86	52	17	77	04	89	55	40
04	52	08	83	97	35	99	16	07	97	57	32	16	26	26	79	33	27	98	66
88	36	68	87	57	62	20	72	03	46	33	67	46	55	12	32	63	93	53	69
04	42	16	73	38	25	39	11	24	94	72	18	08	46	29	32	40	62	76	36
20	69	36	41	72	30	23	88	34	62	99	69	82	67	59	85	74	04	36	16
20	73	35	29	78	31	90	01	74	31	49	71	48	86	81	16	23	57	05	54
01	70	54	71	83	51	54	69	16	92	33	48	61	43	52	01	89	19	67	48

Output

Your output should be the largest product of four adjacent numbers in the same direction within the 20x20 grid. The output should clearly state which direction yielded the maximum product (horizontal, vertical, diagonal).

Hints

Consider using 2D arrays to represent the grid. Develop logic to traverse the grid and calculate products in all possible directions. Keep track of the maximum product while iterating through the grid.

Deliverables

Submit the source code of your C program, with comments explaining the logic and key sections. Provide a brief explanation of the approach taken to solve the problem. Include any additional information that might help in understanding the problem and your solution.