

- 2-13. *Pseudorandom topography*. Generate a 10×10 array of 100 digits from the expression $IP(0.5 + 10 * FP(1000\sin(n/10))) \text{ MOD } 10$, where IP stands for “integral part of” and FP stands for “fractional part of” and n ranges from 0 to 99. If $n/10$ is taken to be in degrees, the first row of the array will begin 0, 7, 5, . . . , and the tenth row will end with 5, 2, 9. (You may read these pseudorandom digits from a table of four-figure natural sines by taking the last figure of each four-figure entry in the ten rows from 0° to 9° .) Smooth this random map by replacing each value by the sum of the nine digits centered on that value, assigning zeros to those of the nine that are outside the 10×10 field. The new array will be 12×12 because of the zeros assigned to the bordering fringe.
- Draw contours for 10, 20, 30, 40 and 50.
 - Locate all the tops; how many are there?
 - Comment on other features you have found.

- 2-18. *Topography*. The accompanying array of data (Fig. 2-56) describes the microwave sun as it was on March 10, 1970. Each number refers to the point midway between the units and tens digits, and the unit is 1000 kelvins.
- Superimpose contours at 20, 40, 60,
 - Indicate all the tops with small triangles.
 - Indicate the concave region by shading.
 - Knowing that the map represents the sun, can you estimate approximately the element spacing in minutes of arc?

0	0	0	0	1	2	4	7	10	12	12	12	14	17	20	18	19	22	21	12	3	-1	0	0	0
1	0	0	0	1	6	17	27	29	24	19	20	24	26	25	21	21	26	26	16	4	-1	0	0	0
2	1	4	1	6	14	34	57	67	54	39	34	37	38	35	29	29	28	24	12	2	-3	-1	-1	0
6	4	4	8	15	25	46	72	87	73	52	41	41	41	38	35	35	32	23	12	4	0	-1	-1	0
10	9	9	16	27	37	47	61	68	52	36	30	42	49	47	43	40	37	29	20	13	6	1	-1	0
11	13	16	29	53	50	47	43	36	25	22	33	53	70	73	65	50	41	33	28	20	12	4	1	-1
10	14	24	40	55	58	50	38	28	25	34	48	66	84	96	91	68	47	35	31	29	26	15	5	-3
9	15	30	47	58	57	50	42	35	39	41	46	50	69	90	94	77	53	36	27	34	46	40	19	-4
7	14	31	46	54	53	49	45	45	41	29	17	19	38	62	73	62	43	29	23	44	75	80	44	3
7	16	33	43	48	51	52	49	42	33	31	39	51	50	53	56	53	27	25	21	44	85	103	71	19
8	18	38	47	49	51	54	53	45	43	80	145	195	162	104	69	63	55	40	37	53	82	96	70	26
13	25	47	57	56	53	54	55	56	56	112	223	316	274	162	86	80	81	68	60	66	75	74	54	22
13	23	56	70	70	62	51	49	60	62	98	190	292	278	168	83	70	79	69	65	73	74	60	36	14
6	24	56	75	76	67	50	43	54	58	60	94	157	168	110	54	41	46	45	50	61	66	53	33	15
-6	9	41	71	74	68	50	40	41	50	45	41	56	66	55	35	24	23	25	34	45	49	41	27	14
-10	-5	21	51	60	54	45	41	35	38	36	33	35	42	45	38	28	25	28	36	35	31	24	16	9
-6	-9	5	29	43	42	38	38	35	32	30	31	34	41	51	50	40	33	34	35	29	20	14	7	4
-1	-5	1	11	24	27	28	31	33	31	30	30	32	37	45	43	35	27	28	27	20	11	6	3	2
0	-1	2	5	11	16	20	25	28	29	31	32	31	30	29	26	22	19	13	14	8	4	2	1	1
0	0	1	2	4	7	10	17	22	26	26	25	24	23	18	13	8	7	7	5	3	1	0	0	0
0	0	1	0	1	2	4	7	11	15	14	13	12	12	9	7	4	4	3	1	0	0	0	0	0

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Figure 2-56 Digital map of the solar brightness at 9.1-cm wavelength on March 10, 1970.