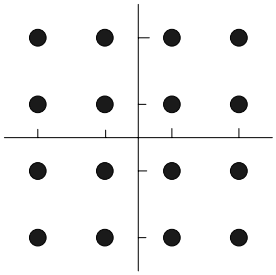
Problem 10.14. Draw the Gray-encoded constellation (signal-space diagram) for 16-QAM and for 64-QAM. Can you suggest a constellation for 32-QAM?

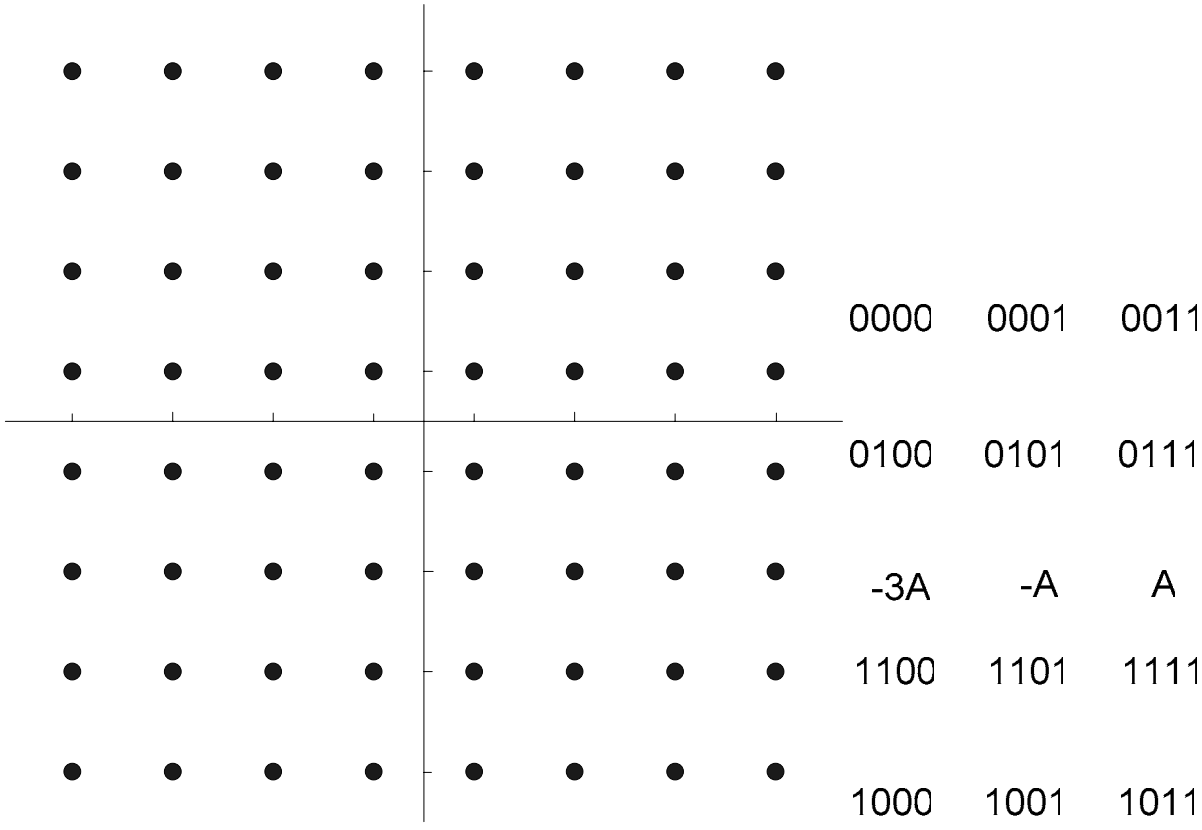
Solution

A general hint for Gray encoding is to
(a) first Gray encode two bits and assign one pair of the resulting encoding to each quadrant.
(b) Gray encode the remaining bits within one of the quadrants.
(c) obtain the Gray encodings for the remaining quadrants by reflecting the result across the in-phase and quadrature axes.

16-QAM constellation:



64-QAM constellation:



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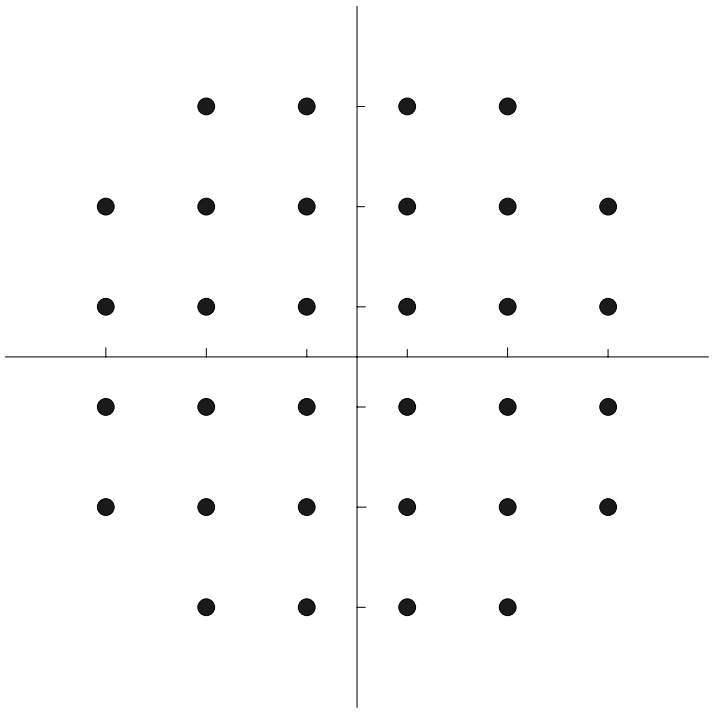
000000 00001 000011 0000

Problem 10.14 continued

32-QAM constellation: (There does not appear to be a Gray encoding for 32-QAM)



10000 10001 1

10101 00000 00001 0

10100 00100 00101 0

-5A -3A -A

11100 01100 01101 0

11101

01000 01001 0

11000 11001 1