

**9.40** Choose  $(d/\lambda)$  so that the array pattern of the array of Problem 9.39 has a null, rather than a maximum, at  $\theta = 45^\circ$ .

**Solution:** With  $a_0 = a_1 = 1$  and  $\psi_0 = \psi_1 = 0$ ,

$$F_a(\theta) = |1 + e^{j(2\pi d/\lambda)\cos\theta}|^2 = 4\cos^2\left(\frac{\pi d}{\lambda}\cos\theta\right).$$

$F_a(\theta)$  is equal to zero when the argument of the cosine function is  $[(\pi/2) + n\pi]$ . Hence, for a null at  $\theta = 45^\circ$ ,

$$\frac{\pi d}{\lambda}\cos 45^\circ = \frac{\pi}{2} + n\pi, \quad n = 0, 1, 2, \dots$$

For  $n = 0$ ,

$$\frac{d}{\lambda} = \frac{1}{2\cos 45^\circ} = 0.707.$$

---