9.45 Choose (d/λ) so that the array pattern of the array of Problem 9.39 has a null, rather than a maximum, at $\theta = 45°$.

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 $\theta = 45°$,

$$\frac{\pi d}{\lambda}\cos 45° = \frac{\pi}{2} + n\pi, \qquad n = 0, 1, 2, \ldots .$$

For $n = 0$,

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