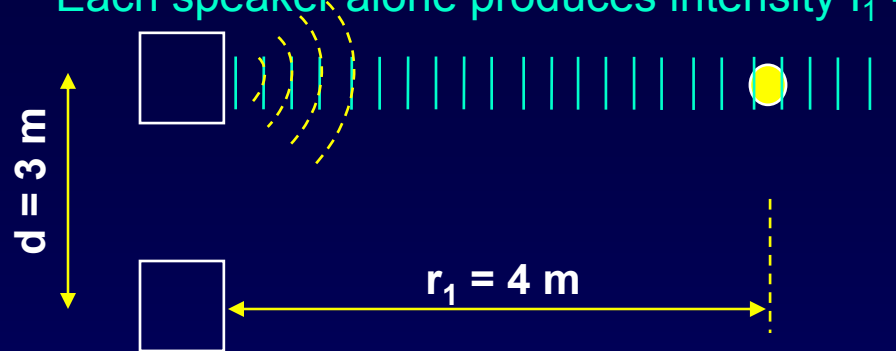


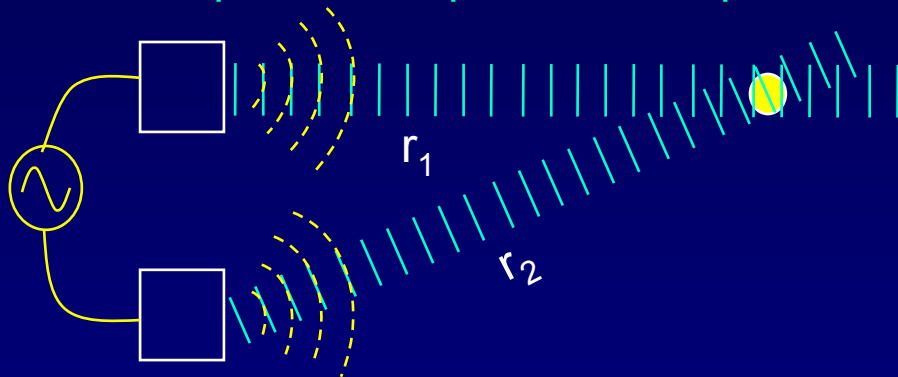
# Solution

Each speaker alone produces intensity  $I_1 = 1 \text{ W/m}^2$  at the listener, and  $f = 300 \text{ Hz}$ .



Sound velocity:  $v = 330 \text{ m/s}$

Drive speakers in phase. Compute the intensity  $I$  at the listener in this case:



Procedure:

- 1) Compute path-length difference:  $\delta = 5 \text{ m} - 4 \text{ m} = 1 \text{ m}$
- 2) Compute wavelength:  $\lambda = v/f = 330 \text{ m/s} / 300 \text{ Hz} = 1.1 \text{ m}$
- 3) Compute phase difference:  $\phi = 2\pi(1 \text{ m} / 1.1 \text{ m}) = 5.71 \text{ rad} = 327^\circ$
- 4) Write formula for resultant amplitude:  $A = 2A_1 \cos(\phi/2) = 2 \cdot 1 \cdot \cos(2.86) = -1.92$
- 5) Compute the resultant intensity:  $I = A^2 = 3.69 \text{ W/m}^2$

The - sign is not significant.  
We care about  $|A|$ .

Nice demo on web: [www.falstad.com/interference](http://www.falstad.com/interference)