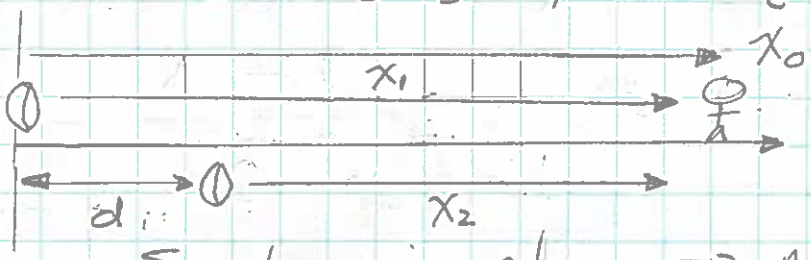
$v = 343\ m/s$ $f = 686\ Hz$

a.)



$\lambda = v/f$

$= 0.5\ m$

Speaker in phase $\Rightarrow \Delta\phi_0 = 0$

For destructive: $\Delta\phi = 2\pi \frac{\Delta x}{\lambda} + \Delta\phi_0 = (m + 1/2)2\pi$

$\Delta x = x_1 - x_2 = d$

So $2\pi \frac{d}{\lambda} = (m + 1/2)2\pi$ for smallest d, $m = 0$

or

$$d = \frac{\lambda}{2} = \frac{1}{2}\left(\frac{v}{f}\right) = \underline{0.25\ m}$$

b.) Out of phase $\Rightarrow \Delta\phi_0 = \pi$

For constructive:

$$\Delta\phi = 2\pi \frac{\Delta x}{\lambda} + \Delta\phi_0 = 2\pi m$$

for smallest d, $m = 1$

$$2\pi \frac{d}{\lambda} + \pi = 2\pi$$

$$d = \frac{\lambda}{2} = \frac{1}{2}\left(\frac{v}{f}\right) = 0.25\ m$$

You can calculate these as above, or you can draw them and count wavelengths.