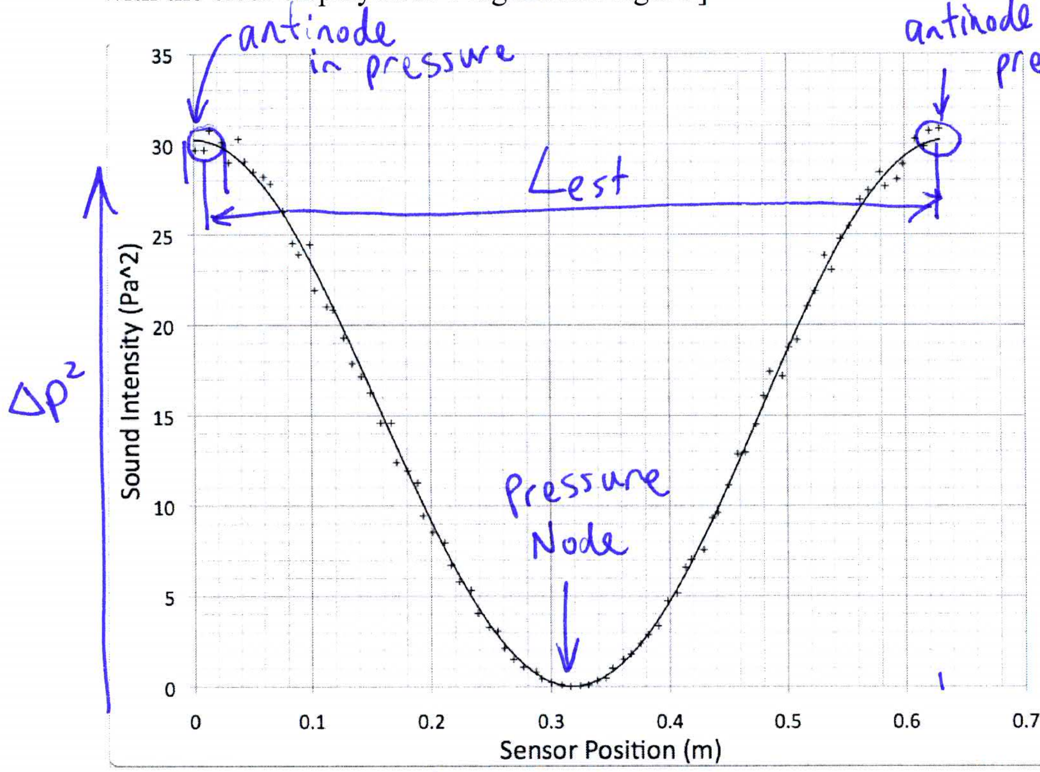
FREE-FORM IN TWO UNRELATED PARTS (12 points total)
Clearly show your reasoning and work as some part marks may be awarded. Write your final answers in the boxes provided.

PART A *[Version of the question with typo in L removed, and scale on graph fixed.]*
In Practicals you set up standing sound waves in a tube filled with air. The frequency of the sound was set to 270 Hz. It was a "closed-closed" tube, which you measure to have a length of $L = 0.636$ m ± 0.004 m. You used a sound sensor which displayed the square of the pressure amplitude, called "Sound Intensity", versus sensor position. Estimate the m-number for the mode of the standing wave, the wavelength of the sound, and the error in this wavelength. [Please write your answers in the boxes provided. m should be displayed to 1 significant figure. Display the wavelength, λ, as *value* ± *error*, with the error displayed to 1 significant figure.]



Compare with Fig 21.16 (a) → this is $m=1$ for pressure

ΔP = pressure above ambient.

Eq. 21.17: $\lambda = \frac{2L}{m} = \frac{2}{1}(0.636 \pm 0.004)$

$\lambda = 1.272 \pm 0.008$ ← Assuming $f = 270$ Hz is an exact resonance of this tube

$m =$ 1

If $f = 270$ Hz is the driving frequency, but not necessarily a resonance, then we must estimate the wavelength as $\lambda = 2 L_{est}$, where $L_{est} = (0.63 \pm 0.03) - (0.01 \pm 0.03)$

$L_{est} = 0.62 \pm 0.04$

λ = 1.272 ± 0.008 m

$\Rightarrow \lambda = 1.24 \pm 0.08$ → or $\lambda = 1.24 \pm 0.08$ m