Ch 5, Ex 1, 2, 3, 5

1) eardrum

\[ f_1 = \frac{v}{4L} = \frac{343}{4(1.02)} = 2880 \text{ Hz} \]

2) Assume distance between ears is \( r_s \sim 6 \text{ cm} \sim 0.15 \text{ m} \)

\[ f = \frac{v}{2r_s} = \frac{343}{0.3} \approx 2300 \text{ Hz} \]

Wavelengths longer (frequencies lower) will diffract around one's head and neither ear will be in the shadow of the head. This makes it more difficult to localize location based on intensity differences, but easier to utilize phase differences.

3) \( f = p, \ A = (10^{-2} \text{ N/m}^2) \cdot A = 10^{-2} \cdot 10^{-4} \cdot 0.55 \text{ N} = 5.5 \cdot 10^{-5} \text{ N} \)

\[ A = 0.55 \text{ cm}^2 \quad 1 \text{ cm} = 10^{-2} \text{ m} \quad 1 \text{ cm}^2 = 10^{-4} \text{ m}^2 \]

8) a) \( \log 50 = \log (2.5 \cdot 2) = \log (2) + \log (2.5) = 1.7 \)

\[ b) \log (0.5) = \log (5 \cdot 10^{-1}) = \log (5) - \log (10) = \log (5) - 1 = -0.3 \]

\[ c) \log (2 \cdot 10^3) = \log (2) + \log (10^3) = \log (2) + 3 = 10.3 \]

\[ d) \log (16) = \log (2 \cdot 2 \cdot 2 \cdot 2) = 4 \log (2) = 1.2 \]