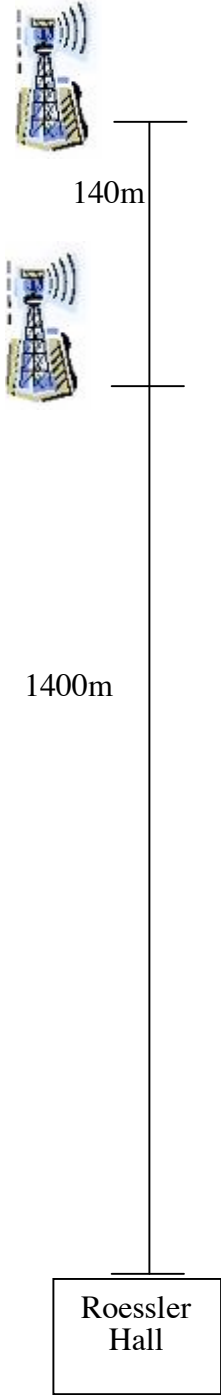


Rubric Codes: _____ Student ID: _____ first 3 letters last name

I certify by my signature that I will abide by the code of academic conduct of the University of California. Signature _____

A radio station transmits at about 1070kHz from two towers spaced 140 m apart and located to the north of Roessler Hall by 1400m and 1540m as shown to the right (image not to scale). Each tower emits a radio wave in all directions, though for this problem you need only consider the transmission in the direction of Roessler. As a result of the transmission, the entrance to Roessler receives a radio transmission of constant maximal amplitude. (Radio waves are a type of light waves.)



- (a) Explain in words and/or equations (i) what must be happening at the entrance to Roessler Hall, and (ii) how the different quantities in the wave equations for each tower compare relative to each other (e.g., same as/different than) for this to happen. Use a phase chart to organize your thinking and summarize your results.

- (b) Consider now different locations along the path between Roessler Hall and the southernmost transmission tower. Will the different locations have constant maximal amplitude, or are there different locations with different types of interference? Again, a phase chart may help organize your thinking.

- (c) Find one other frequency the towers could use to produce constant maximal amplitude at the location of Roessler Hall.

$y(x,t) = A \sin\left(\frac{2\pi t}{T} \pm \frac{2\pi x}{\lambda} + \phi\right)$
Speed of light: 3×10^8 m/s
Speed of sound in air: 350 m/s