

Problem Set #2

Physics 302

Tuesday, 30 January 2024

The following problems come from *Vibrations and Waves* (1971), by AP French.

- Problem 2-1 on page 39 \Rightarrow (15 points) It is important to know how to transfer between trigonometric forms and exponential forms.
- Problem 2-2 on page 39 \Rightarrow (15 points) Use complex numbers! For example, write the first simple harmonic motion as $z_1 = A_1 e^{j\omega t}$. Write similar expressions for the other two simple harmonic motions. Add the three complex numbers and go from there. After you have solved the problem, make a sketch of the three vectors added together in the complex plane.
- Problem 2-3 on page 39 \Rightarrow (10 points) The book does not include units in the problem statement, so you do not need to worry about units in this problem. Find the beat period analytically, and then make a nice plot in *Mathematica* of one period of your result.
- Problem 2-5 on page 39 \Rightarrow (15 points) Determine the period ratio analytically. Use *Mathematica* to make the Lissajous figure. Make sure the direction of motion is clear on your plot. Feel free to animate the motion if you need help visualizing the direction.

Due date: **Tuesday, 06 February 2024** (*beginning of class*)