Read Unit 2 Chapter 4 (all) and Chapter 5 thru part (9).

1.In class† we constructed a quadratic dispersion (υ,κ)-plot (frequency υ *vs* wavenumber κ) for the case of quadratic dispersion $\upsilon=\kappa^2$. The case involved a 1-CW (single coherent wave) with wavenumber $(\upsilon=-1)$ colliding with another 1-CW of wavenumber $(\upsilon=+2)$ and required you to derive and plot 2-CW (pair of interfering coherent waves) parameters of *frequencies* $\upsilon^{2\text{-}CW}_{Phase}$ *and* $\upsilon^{2\text{-}CW}_{Group}$ and *wavenumbers* κ^{2-CW}_{Phase}, κ^{2-CW}_{Group}. With these we found wave velocities $V^{2\text{-}CW}_{Phase}$ *and* $V^{2\text{-}CW}_{Group}$.

Now do this for the case of linear dispersion $\upsilon=\kappa^1$ involving a 1-CW (single coherent wave) with wavenumber $(\upsilon=-1)$ colliding with another 1-CW of wavenumber $(\upsilon=+4)$. Use per-spacetime graph paper provided in class† to find 2-CW parameters $\upsilon^{2\text{-}CW}_{Phase}$, $\upsilon^{2\text{-}CW}_{Group}$, κ^{2-CW}_{Phase}, κ^{2-CW}_{Group}, and velocities $V^{2\text{-}CW}_{Phase}$ *and* $V^{2\text{-}CW}_{Group}$. Make a table of the wave per-space-time parameters and (reciprocal) space-time ones as done in class.

2.The second part of the class† construction involved using the space-time 2-CW parameters that are reciprocals of $\upsilon^{2\text{-}CW}_{Phase}$, $\upsilon^{2\text{-}CW}_{Group}$, κ^{2-CW}_{Phase}, κ^{2-CW}_{Group}, namely periods $\tau^{2\text{-}CW}_{Phase}$, $\tau^{2\text{-}CW}_{Group}$ and wavelengths λ^{2-CW}_{Phase}, λ^{2-CW}_{Group}.

Now do this for the case of linear dispersion $\upsilon=\kappa^1$ (in part 1) and use the provided spacetime graph paper to plot and label a lattice for ideal 2-CW real-zeros in space and time. Label the line segments that correspond to periods and wavelengths as was done in class. Choose points so you make a symmetric array around origin (0,0) having at least 16 cells. Accuracy and neatness counts here. Precision should be to a fraction of the tiniest square on the graph.

† Class step-by-step constructions are in Lecture 22 ranging from p. 40 to around p.70.
BohrIt animations in lecture show space-time lattices. First example is around p. 40.