Lecture 9, Question 1

- Define a Graphon

- Explain the use of the graphon a a generative model of graphs

- Illustrate the concept with a stochastic block model

- Explain the concept of homomorphism density for unweighted graphs
- Explain the concept of homomorphism density for graphons
- Define convergence of graph sequences in the sense of homomorphism densities

- Define a graphon signal

- Define induced graphs and induced graph signals

- Introduce the definition of a convergent sequence of graph signals

- Define eigenvectors and eigenfunctions of graphons

- Eigenvalues of graphons are countable. They are between -1 and 1. And they accumulate at 0. Explain.

Lecture 9, Question 5

- Eigenvalues of a graph sequence that converges to a graphon converge to the graphon eigenvalues. Explain.

- Define the graphon Fourier transform

- This could imply convergence of the graph FT to the graphon FT. Alas, it does not. This is because we need eigenvectors, not eigenvalues to converge. Explain.

- An eigenvector of a graph sequence that converges to a graphon converges to the graphon eigenvector. However, the convergence depends on how close the eigenvalue associated to the eigenvectors is to other eigenvalues. Explain

- This fact precludes convergence of the graph FT to the graphon FT unless we restrict attention to graphon bandlimited signals. Explain.

- State a convergence theorem for the graph FTs of a sequence of graph that converges to a graphon.

- Define graphon filters. They have the same algebraic structure of graph filters. Explain.

- Graphon filters are pointwise in the Graphon FT domain. Explain.

- Define the frequency response of a graphon filter

- This is the same definition of the frequency response of a graph filter. It helps explain the transferability of graph filters. Explain.