Biochemistry Cumulative Examination
February 2, 2017, Total 100 points

1. Many cell signaling pathways involve the formation of higher-order signaling complexes (or signalosomes. (1) Describe how the high-order assembly of signaling molecules affects the dose-response curve and the temporal response to stimuli, (2) explain why, and (3) describe the physiological advantages of such responses (40 points).

2. Dishevelled (Dvl) is a scaffold protein that plays a pivotal role in Wnt signaling. Dvl contains the N-terminal DIX domain that forms a filament-like structure when expressed as an isolated domain. Unlike amyloid fibrils, however, this structure can be reversibly dispersed into the solution. For Dvl to perform its function in Wnt signaling, it should interact with another scaffolding protein, axin via its DIX domain. Kd for association of Dvl-DIX and axin-DIX is 5 μM.

1) Describe how the DIX domain contributes to the signaling activity of Dvl and explain why (20)

2) How would test the role of the DIX domain in the signaling activity of Dvl? (20).

3) Propose mechanisms for physiological regulation of the DIX domain function (20)