BE 159 Winter 2016
Homework #6
Due by 5 pm, March 16, 2016

Please submit the homework via email in PDF format to Justin, Bianca, and Soumya. No other formats, including MS Word, will be accepted. You can scan any handwritten portions of the homework.

Problem 1 (Flow patterns in *C. elegans* (25 points))**.**
In the Mayer, et al paper, we studied cortical flow in the one-cell *C. elegans* embryo. The cortex is in contact with the cytoplasm. If the cytoplasm is a viscous fluid, we might expect that the movement of the cortex will drive flow in the cytoplasm.

a) Make a sketch of the flow we would expect in the cytoplasm.

b) Imagine we take a cross section at the center of the one-cell *C. elegans* embryo that is orthogonal to the anterior-posterior axis. What is the *net* flow of cytoplasm that flows through this cross section?

Problem 2 (Hydrodynamic coupling (25 points))**.**
Say I have two beads or radius a (say of order one micron) next to each other in a very viscous fluid, such that the distance between them is not too big, say of order a. The bead on the right is ferromagnetic, but the one on the left is not.

a) If I pull the ferromagnetic bead to the right using a magnet, what happens to both beads?

b) Now, say the ferromagnetic bead moves leftward. What happens to both beads?

c) Repeat (a), except with the beads now embedded in an elastic medium.

d) Why am I asking you this? In other words, what consequences might the physics exposed by these toy questions have on developmental processes?

Problem 3 (Which papers? (10 pts))**.**
What paper that we read/discussed did you enjoy the most and/or get the most out of? You can also include papers from the presentations. Which did you enjoy the least? Please give reasons why you made the choices you did.

Problem 4 (What you walk away with (10 pts))**.**
What aspects of the course were most beneficial to you? Where there things that you think we could cut or change to make better use of time? In particular, I would like to improve the in class discussion of papers. Do you have any suggestions on how to better do that?

Problem 5 (Student presentations (10 pts))**.**
Did you find the student presentations informative to listen to? Were they useful to give? What suggestions, if any, do you have to the format of the talks?

Problem 6 (Course structure (20 pts))**.**
Write a brief statement on your thoughts about the way this course was structured. Did you like that

it was literature-based with lecture material built around the background for each paper? Would you prefer a more traditional approach? What general suggestions for improvement do you have?