(1) Please sketch the direction field for $\dot{x} = x(1 - x)$.

(2) Consider the equation $\ddot{x} - 3\dot{x} + 2x = 0$.
    (a) Convert the equation into two first order ODEs
    (b) Compute the eigenvalues
    (c) Compute the eigenvectors

(3) We talked about two species in class. Now suppose we add in a carnivore (label it $z$). Lets say the carnivore eats the herbivore ($y$) at a 1:1 rate. Further, suppose its birth rate is equivalent to the population size of the herbivores ($y$) and its death rate is twice its own population size. Everything else stays the same as the model in class. Model this new system. Can you find the fixed points? What conclusions can you make?

(4) Now lets think about possible project ideas. You can write some models of various scenarios if you like, but here is a sample scenario from me: suppose instead of a carnivore, we have an omnivore. So, it eats both the herbivore ($y$) and the plant ($x$), however it likes to eat the herbivore more and it is a big eater, so lets say it eats the plants at twice the rate of the herbivore from the original problem and eats the herbivore twice as much as it eats plants. What can we say about this system? Can you make a hypothesis before doing any analysis?