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CS 470 Long HW 1
Question 1 Report

Observations on Tasks 1, 2, & 3:

Task 1 examines the evolution of friendliness values in a social network where the initial mean friendliness (μ) > 0, with initial values ranging between -0.25 and 0.75. The plot demonstrated that positive (blue) relationships grew rapidly over time. The negative (red) relationships did not change as drastically in the same direction, instead they remained close to neutral or also joined the exponential curve and became positive. So it's seen that over time, the positive edges reinforced each other and the initially negative edges, resulting in exponential positive growth towards the end of the simulation where all edges ended up being positive. Task 2 simulated the evolution of friendliness in a network with an initial neutral mean friendliness value ($\mu = 0$) using a distribution range of -0.5 to 0.5. The resulting plot displayed a clear division: positive edges (blue lines) grew steadily, while negative edges (red lines) deepened slightly. Initially, the neutral relationships did not experience drastic changes, with some positive edges gaining strength and negative edges becoming more negative there were also some positive edges becoming negative and some negative edges becoming positive. The overall rate of growth for both types of relationships was moderate, especially compared to the more positively biased simulation in Task 1. Task 3 involved a simulation where the initial mean friendliness was negative ($\mu < 0$), with initial values ranging from -0.75 to 0.25. In this scenario, the network was predominantly biased towards negativity. The plot showed that the negative relationships (red lines) deepened over time, reinforcing themselves and growing more negative. Positive relationships (blue lines), though present, struggled to grow and did so at a much slower pace compared to the negative ones.

Task 4:

For Task 1, the produced pattern is consistent with the theory that positive relationships reinforce each other, causing them to strengthen over time, while negative ones have less impact in this positively biased environment. At the end of the simulation, most edges were positive, with very few remaining negative, indicating that initial positivity leads to the dominance of positive friendliness. This reflects real-world social dynamics, where positive environments tend to produce stronger and more cohesive relationships, while negativity weakens or dissipates. In Task 2, as time progressed, the network displayed a clear divergence, with positive relationships strengthening, though not at an accelerated rate, while negative relationships grew increasingly negative. This reflects a balanced scenario where relationships either improve or deteriorate based on initial conditions, but the rate of change is not as pronounced due to the initial neutrality. In real-life contexts, this suggests that in environments without strong initial biases,

relationships can evolve in either direction, with both positive and negative outcomes possible depending on interactions. In Task 3 the positive edges showed some growth, but their influence remained limited in this predominantly negative environment. The negative relationships continued to deteriorate, with a widening gap between positive and negative edges by the end of the simulation. This demonstrates how negativity, when dominant from the outset, tends to reinforce itself, leading to a more hostile or unfriendly social network. Positive relationships, although they can exist, find it difficult to thrive in such an environment, much like how in real-world social settings, conflict and hostility can escalate without intervention, making it difficult for positive bonds to form and grow.