

# Homework 2

CAAM 28200: Dynamical Systems with Applications

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## Problem 6

I plotted the phase portraits for  $r < 0$ ,  $0 < r < 1$ , and  $r > 1$  below. We see how the solution is a stable spiral when  $r < 0$ , a stable node when  $0 < r < 1$ , and a saddle when  $r > 1$ .

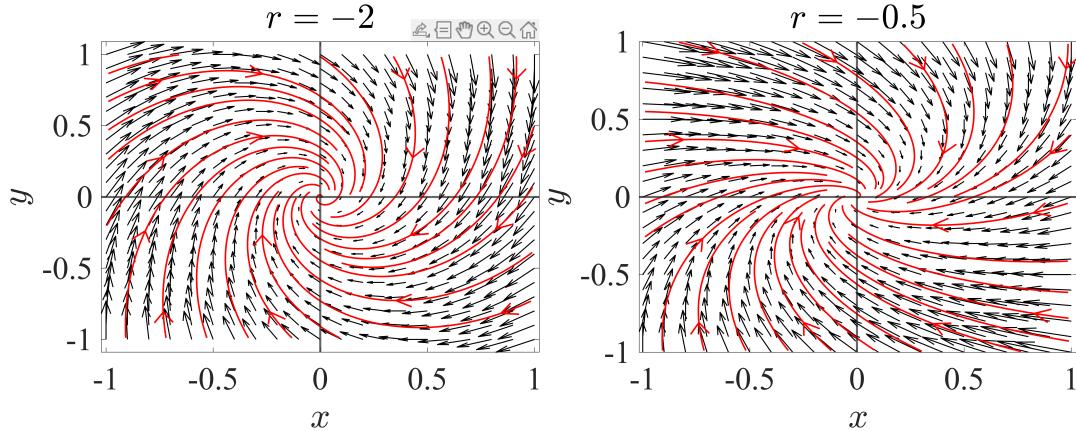


Figure 1: Phase Portraits for  $r < 0$

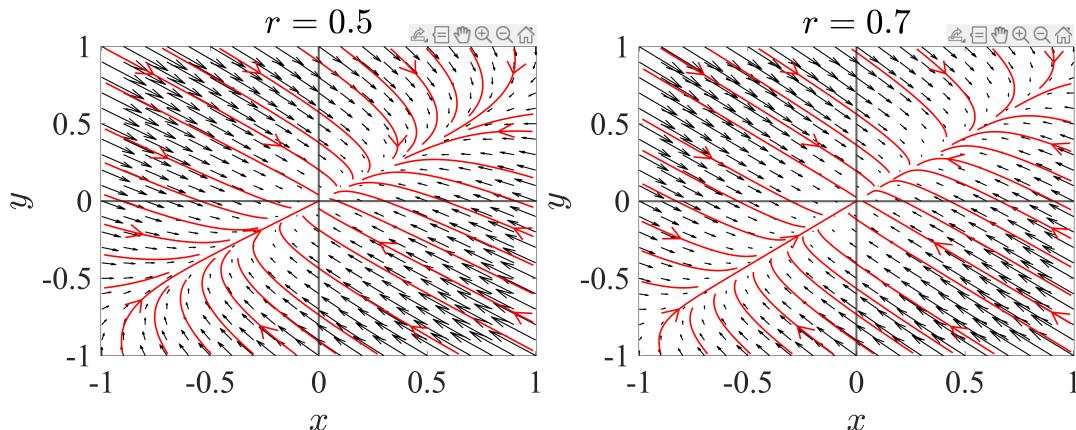


Figure 2: Phase Portraits for  $0 < r < 1$

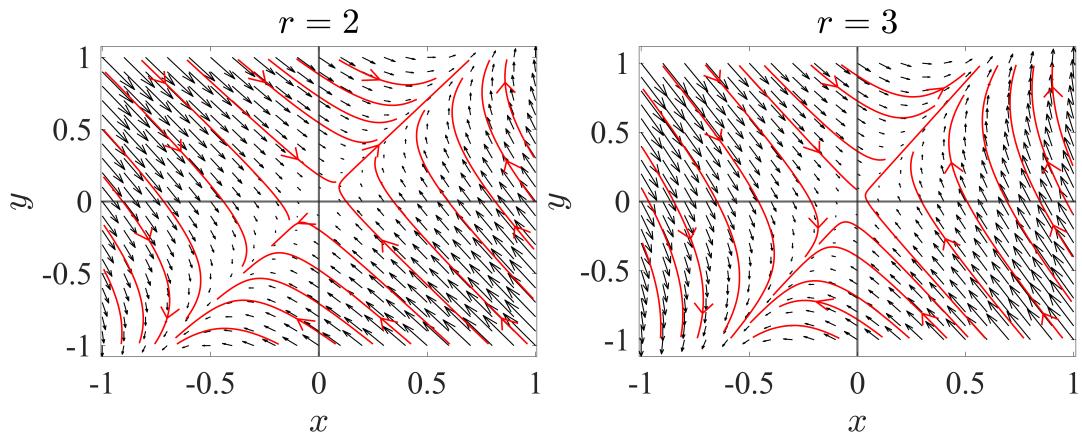


Figure 3: Phase Portraits for  $r > 1$

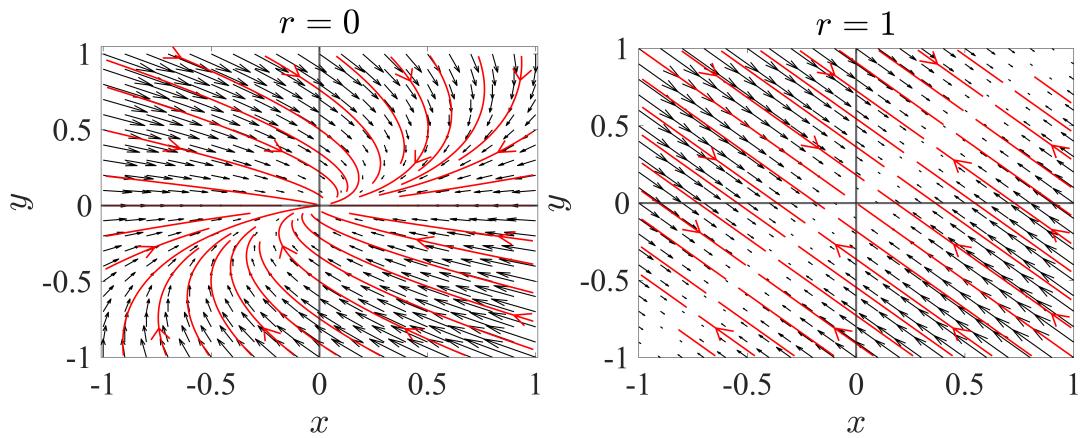


Figure 4: Phase Portraits for Marginal Cases