

**Instructions:** Show all work. Use exact answers unless otherwise asked to round.

1. Consider the differential equation  $\frac{dP}{dt} = 0.01P \left(1 - \frac{P}{1000}\right) \left(\frac{P}{10} - 1\right)$ . Sketch a direction field and phase line. If population is given in thousands, identify the population that corresponds to the threshold, and which is the carrying capacity.

2. Write a differential equation and phase line for the direction field shown below. Identify if any of the equilibria are thresholds or carrying capacities.

