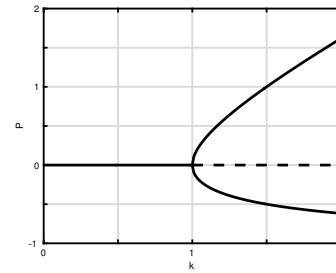


6. [16 points] Consider a animal population modeled by a differential equation $P' = f(P)$, where the function $f(P)$ involves a parameter k . At $k = 1$ there is a bifurcation point, as shown in the bifurcation diagram to the right. In this figure, solid curves indicate stable solutions while dashed curves indicate unstable ones. Even though $P < 0$ is not physically realizable, include negative values of P in your analysis in parts (a) and (b) below.



- a. [6 points] Sketch phase diagrams for the differential equation $P' = f(P)$ for $k = 0.5$, $k = 1$ and $k = 1.5$.
- b. [6 points] Sketch qualitatively reasonable solution curves this equation for the case $k = 1.5$.
- c. [4 points] Thinking of P as an animal population, what is the implication of the bifurcation point? Give a possible explanation for what k could measure.