Consider the cubic population model
$$\frac{dN}{dt}=cN\left(N-κ\right)(1-N)$$

Where $c$ and $κ$ are given constants, such that $c>0$ and $0<κ<1$. Note that the population $N$ is measured in units of thousands.

1. Find and classify the steady states $N\_{1}<N\_{2}<N\_{3}$ of this equation.
2. If the initial population is $N\_{0}$ describe, without proof, the future of the population, distinguishing various cases on the size of $N\_{0}$ relative to the steady states $N\_{1}, N\_{2}$ and $N\_{3}$.
3. Obtain the solution of the differential equation with initial condition $N\left(0\right) $=2, assuming the parameters $c=1$ and $κ=\frac{1}{2}$.

**Hints:** If you encounter a quartic equation for $N$, consider the substitution $K=N-\frac{1}{2}$. For choosing the right signs in extracting roots, you should assume $N\geq 1$.