1. Use the Cauchy integral formula to compute the number of complex roots in a disk centered at 0 and with radius 1.1 of \((x + 1) \sin(2x)\).

Give the number of roots in that disk of the complex plane.
Write all relevant PARI/GP commands.

2. Consider the polynomial system

\[
\begin{align*}
  x^2y - y^3 + 4x + 2 &= 0 \\
  x^3y + 3x^2 - 4y - 9 &= 0.
\end{align*}
\]

Use a lexicographic Gröbner basis to compute the number of solutions.
Write all relevant Singular commands. What is the number of solutions?