

FIRST NAME:

LAST NAME:

2016-02-05

Your solutions must include all necessary comments and calculations.

1. (a) Solve $z^3 + 1 = 0$ (b) Calculate $\left(\frac{1}{2} - i\frac{\sqrt{3}}{2}\right)^{100}$	
2. Discuss solvability of the system of equations $\begin{cases} x + 2y + 3z = 1 \\ -x + y - z = -1 \\ ax - 10y + 5z = -1 \end{cases}$ in terms of parameter a . Solve the system when it has unique solution.	
3. Find the limits (a) $\lim_{x \rightarrow \infty} \left(\frac{x^2 - 2x + 1}{x^2 - 4x + 2}\right)^x$ (b) $\lim_{x \rightarrow \infty} \frac{\ln(1 + e^{3x})}{\ln(1 + e^x)}$	
4. Find all local extrema and examine monotonicity of $g(x) = x - \arctan(2x)$	
5. Show that the composition of two 1-1 functions is a 1-1 function	