Winter 2013 MAT 334 (LEC5010) Exam 1

You have 50 minutes. Answer 4 of the following 5 questions. If you answer all 5, your score will be determined by the best 4 solutions you provide.

Problem 1. *Find all solutions $z \in \mathbb{C}$ of the equation*

$$(z + i)^4 + i = 0.$$

Problem 2. *Let C denote the right half of the positively oriented unit circle about the origin, i.e., counterclockwise from $-i$ to i. Evaluate*

$$\int_C \frac{\text{Log } z}{z} dz,$$

where "Log" denotes the principal logarithm.

Problem 3. *Find all $z \in \mathbb{C}$ for which $\sin z = 0$.*

Problem 4. *Given a positive integer m, find all boundary points of*

$$F = \left\{ \frac{m + 1}{m} \cdot e^{\frac{2\pi}{m} \cdot i} \right\} \subseteq \mathbb{C}.$$

Problem 5. *Find all points for which the following function is continuous:*

$$h : \mathbb{C} \setminus \{0\}, \qquad h(z) = \begin{cases} \text{Arg } z & \text{Im } z \geq 0, \\ -\text{Arg } z & \text{Im} < 0. \end{cases}$$