

EECS498-003 - Lab 5

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Administrivia

- ▶ Problem Set 2 due (next) Wednesday, October 1
- ▶ Midterm set for Thursday, October 23, 6-8pm, DOW1014
- ▶ Today: Write out an invariant for last lab's crawler, then another exercise

Crawler Practice

Crawler robot has coordinates $(x, y) \in \mathbb{Z}^2$, and a facing direction North/East/South/West.

- ▶ Robot starts at $(0, 4)$ facing north.
- ▶ Robot can only move 1 unit in facing direction.
- ▶ Robot can turn north when $y \geq 0$, south when $y \leq 0$, west when $y \geq 4$, east when $y \leq -4$.
- ▶ When robot $|x| \geq 10$, robot can warp to $(-x, -y)$ and faces south when $-y \leq 0$, north when $-y > 0$.
- ▶ Prove: Robot never is inside or on the radius 3 dangerous circle at the origin.
- ▶ Starter code at `lab04.dfy` on the course GitHub

Zero-Sum Society

Nonempty group of people who are each assigned a wealth $\in \mathbb{Z}$.

- ▶ Life begins with each person at 0 wealth.
- ▶ One person can transfer their wealth to **another** person; that is, for any $w \in \mathbb{Z}$, they can subtract w from their wealth and add w to the other's wealth.
- ▶ Prove: There always exists someone in the group who is not in debt, i.e., has wealth ≥ 0 .
- ▶ Starter code at `lab05.dfy` on the course GitHub