**CS5187 Assignment 2**

# Lecturer: Shiqi Wang **Due on April 22, 2025 11:59 pm**

# You should submit your solution to canvas before the deadline. Late submission halves the score.

***For all the problems in this* assignment*, you SHOULD present your solution step by step instead of giving the answers only.***

## Question 1:

You are using **RANSAC** to fit a **linear regression model** to a dataset that contains **70% inliers** and **30% outliers**. The minimal sample size required to fit a line is **2 points**.

1. **Probability of a Good Sample:**

What is the probability that a randomly selected minimal sample (2 points) consists of **only inliers**?

1. **Iterations Needed for Reliable Fitting:**

How many RANSAC iterations are needed to ensure **at least 95% confidence** that at least one of the selected samples has no outliers?

## Question 2:

The camera shown in the following figure has its x, y and z axes aligned with the world's y, z and x axes respectively. The world frame's origin is at (0, -h, 4h) in the camera's frame.

Chart

Description automatically generated with medium confidence

1. Find the camera's extrinsic camera calibration matrix [R T], such that
2. Assuming that intrinsic camera matrix is just a 3 x 3 identity matrix. Derive the image coordinates of the vanishing point of the family of lines parallel to the following line, expressed parametrically as: