1 Question 1

Moving robot gets odometry measurements at each step. Additionally, gets image observations of a single landmark at time steps 1 and 4.

1.1

Develop posterior at time 4 in terms of measurement and motion models, assume prior exists for x_1

1.2

Draw corresponding factor graph. Detail what every node and edge correspond to.

1.3

Eliminate factor graph into a Bayes net, assuming elimination order x_1, x_2, x_3, x_4, l. Detail your calculations. Draw obtained Bayes net and square root information R matrix sparsity pattern.

2 Question 2

Given:

- camera 6 DoF pose R_C^G, $t_{G\to C}^G$
- camera calibration matrix K
- landmark l^G **given** (in global frame)

2.1

Develop projection matrix M^r for camera r, note all dimensions.

2.2

Express projected pixel coordinates $\begin{pmatrix} u \\ v \end{pmatrix}$ of a point $\begin{pmatrix} x \\ y \\ z \end{pmatrix}^G$ in terms of M^r components.

2.3

Given n observations of the landmark $\{(u_i, v_i)\}_{i=1}^n$ and the corresponding camera projection matrices M^i, describe a way to estimate it.

2.4

Failed to reverse engineer