

COMP417
Quiz on GraphSLAM

First Name:

Last Name:

Student ID:

Thursday 9th March, 2017

Each of the following questions is worth 1 point

1. Suppose the 1D random variable x has variance $\sigma_x^2 = 10$. Then the random variable $z = 2x + 1$ has variance:
2. Suppose the 1D random variable x has mean $\mu_x = 10$. Then the random variable $z = 2x + 1$ has mean:
3. Suppose the 2D random variable \mathbf{x} has covariance matrix $\mathbf{\Sigma}_x$. Then the covariance matrix of the random variable $\mathbf{z} = \mathbf{A}\mathbf{x} + \mathbf{b}$, where \mathbf{b} is a constant vector is:
4. Suppose the 2D random variable \mathbf{x} has mean $\boldsymbol{\mu}_x$. Then the mean of the random variable $\mathbf{z} = \mathbf{A}\mathbf{x} + \mathbf{b}$, where \mathbf{b} is a constant vector is:
5. Write down the terms of the GraphSLAM cost function $J(\mathbf{x}_1, \mathbf{x}_2, \mathbf{x}_3, \mathbf{m}_0, \mathbf{m}_1)$ for the scenario shown in Figure 1:

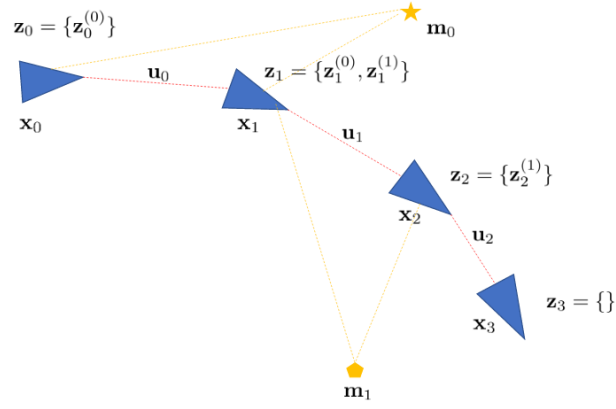


Figure 1: State \mathbf{x}_0 is known and fixed. The dynamics model is assumed to be $\mathbf{x}_{t+1} = f(\mathbf{x}_t, \mathbf{u}_t) + \mathbf{w}_t$ with $\mathbf{w}_t \sim \mathcal{N}(\mathbf{0}, \mathbf{Q})$. The observation model is assumed to be $\mathbf{z}_t^{(k)} = h(\mathbf{x}_t, \mathbf{m}_k) + \mathbf{n}_t$ where $\mathbf{n}_t \sim \mathcal{N}(\mathbf{0}, \mathbf{R})$.