Midterm Bonus

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3. a.

$$X = \begin{bmatrix} l_1 c_1 \\ l_1 s_1 \\ \theta_1 \end{bmatrix} \quad \bar{J} = \begin{bmatrix} -l_1 s_1 \\ l_1 c_1 \\ 1 \end{bmatrix}$$

b.

$$X = \begin{bmatrix} l_1 c_1 + l_2 c_{12} \\ l_1 s_1 + l_2 s_{12} \\ \theta_1 + \theta_2 \end{bmatrix} \quad \bar{J} = \begin{bmatrix} -l_1 s_1 - l_2 s_{12} & -l_2 s_{12} \\ l_1 c_1 + l_2 c_{12} & l_2 c_{12} \\ 1 & 1 \end{bmatrix}$$

c.

$$X = \begin{bmatrix} \sum_{i=1}^{n} l_i c_{1\ldots i} \\ \sum_{i=1}^{n} l_i s_{1\ldots i} \\ \sum_{i=1}^{n} \theta_i \end{bmatrix}$$

d.

$$\bar{J}_{*i} = \begin{bmatrix} \sum_{j=i}^{n} -l_j s_{1\ldots j} \\ \sum_{j=i}^{n} l_j c_{1\ldots j} \\ 1 \end{bmatrix}$$

Got a & b wrong b/c I forgot to write down the Jacobian.
Got d wrong b/c in the ith col, it should be $\partial x/\partial \theta_i = \sum_{j=i}^{n} -l_j s_{1\ldots j}$ instead of $\partial x/\partial \theta_i = \sum_{j=i}^{n} -l_j s_{j\ldots n}$. The same was true for $\partial y/\partial \theta_i$

3: $\begin{bmatrix} -l_1 s_1 - l_2 s_{12} - l_3 s_{123} & -l_2 s_{12} - l_3 s_{123} & -l_3 s_{123} \end{bmatrix}$

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