

# Intro to AI Assignment 3 - Probabilistic Reasoning

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## §1 Problem 1

## §2 Problem 2

## §3 Problem 3

## §4 Problem 4

We can model the system as a hidden Markov model. We can model  $X_t$  as a Markov chain with the states  $\{A, B, C, D, E, F\}$  and transition matrix:

$$\begin{pmatrix} 0.2 & 0.8 & 0 & 0 & 0 & 0 \\ 0 & 0.2 & 0.8 & 0 & 0 & 0 \\ 0 & 0 & 0.2 & 0.8 & 0 & 0 \\ 0 & 0 & 0 & 0.2 & 0.8 & 0 \\ 0 & 0 & 0 & 0 & 0.2 & 0.8 \\ 0 & 0 & 0 & 0 & 0 & 1 \end{pmatrix}$$

In addition, we have the observation matrices for hot and cold:

### §4.1 Part 1

We know that the rover starts at state A with probability 1, so  $P(X_1 = A) = 1$ . The initial state vector is therefore  $[1, 0, 0, 0, 0, 0]^T$ .

## §5 Problem 5