# HW03 Andrew Chang (andrew51)

## Problem 1

$$
\begin{aligned}
P(x|y,z) &= \frac{P(x,y,z)}{P(y,z)} \\
&= \frac{P(x,y,z)}{P(y|z)P(z)} \\
&= \frac{P(y|x,z)P(x,z)}{P(y|z)P(z)} \\
&= \frac{P(y|x,z)P(x|z)P(z)}{P(y|z)P(z)}
\end{aligned}
$$

## Problem 2

a.

P(x = 4) = P(x = 3 | right) + P(x = 4 | same)

(0.4)(0.8) + (0.1)(0.2) = 0.32 + 0.02 = **0.34**

P(x=3 | right) + P(x = 3 | same) (0.5)(0.8) + (0.4)(0.2) = 0.4 * 0.08 = **0.48**

P(x = 2 | stay) (0.5)(0.2) = **0.1**

P(x = 5 | right) (0.1)(0.8) = **0.08**

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b. Using values from A, we get:

(0.1)(0.3) 1, Stay, False

(0.7)(0.8) 1, Move, True

(0.3)(0.1) 3, Stay, False

(0.7)(0.8) 3, Move, True

(0.3)(0.8) 5, Stay, True

(0.7)(0.1) 5, Move, False

[0.03, 0.56, 0.03, 0.56, 0.24, 0.07]

Normalize

[0.0196, 0.3660, 0.0196, 0.3660, 0.1568, 0.0458]

## Problem 3

Given 2.5m of braking distance

a. Min Brake Dist. = 60m + 15m + 2.5m = **77.5m**

b. Final Dist. = 77.5m - 2.5m = **75m**

While this number is a good reference, in real world situations it’s likely unreasonable to model this behavior.

c. 3sqrt(1.5) + 3sqrt(6) + 2.5m = **13.5m**

While this model introduces more risk due to the shorter braking distance, it’s more efficient.