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## 4.1.1 Predicting the Weather

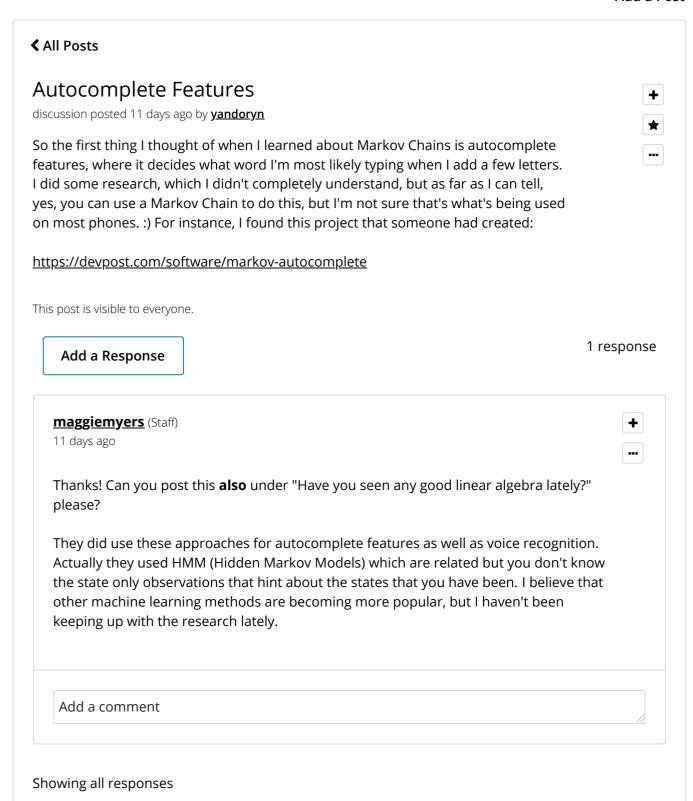
# 4.1.1 Predicting the Weather

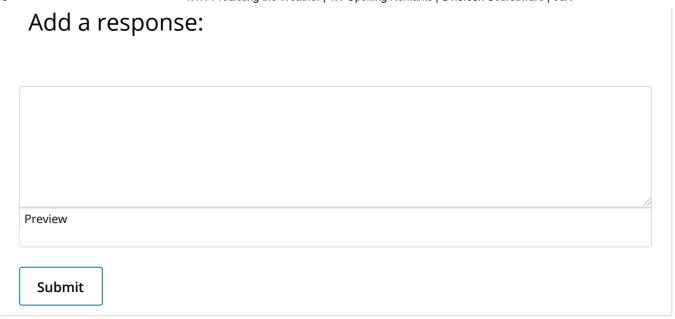
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**Topic:** Week 4 / 4.1.1

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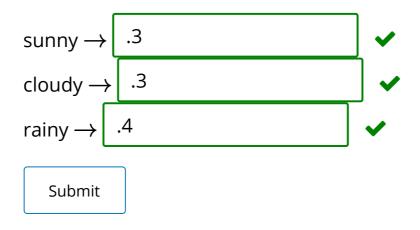


### Homework 4.1.1.1

3/3 points (graded)

		Today		
		sunny	cloudy	rainy
Tomorrow	sunny	0.4	0.3	0.1
	cloudy	0.4	0.3	0.6
	rainy	0.2	0.4	0.3

If today is cloudy, what are the probability that tomorrow is



✓ Correct (3/3 points)



#### Video

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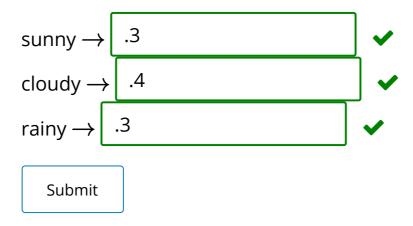
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Homework 4.1.1.2

3/3 points (graded)

		Today		
		sunny cloudy ra		rainy
Tomorrow	sunny	0.4	0.3	0.1
	cloudy	0.4	0.3	0.6
	rainy	0.2	0.4	0.3

If today is sunny, what is the probability that the day after tomorrow is



✓ Correct (3/3 points)



#### Video

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#### Homework 4.1.1.3

1/1 point (graded)

		Today		
		sunny	cloudy	rainy
	sunny	0.4	0.3	0.1
Tomorrow	cloudy	0.4	0.3	0.6
	rainy	0.2	0.4	0.3

Follow the instructions in the above video.

✓ Done			
<b>~</b>			
Submit			
✓ Correct	(1/1 point)		



#### Video

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#### Homework 4.1.1.4

9/9 points (graded)

#### Given

		Today		
		sunny	cloudy	rainy
Tomorrow	sunny	0.4	0.3	0.1
	cloudy	0.4	0.3	0.6
	rainy	0.2	0.4	0.3

fill in the following table that predicts the weather the day after tomorrow given the weather today:

		Today		
		sunny	cloudy	rainy
Day after Tomorrow	sunny			
	cloudy			
	rainy			

.3	.25	.25
✓ Answer: 0.3	<b>✓ Answer:</b> 0.25	<b>✓ Answer:</b> 0.25
.4	.45	.4
✓ Answer: 0.4	<b>✓ Answer:</b> 0.45	✓ Answer: 0.4
.3	.3	.35
✓ Answer: 0.3	✓ <b>Answer</b> : 0.3	✓ Answer: 0.35

#### **Explanation**

**Answer:** By now surely you have noticed that the jth column of a matrix A,  $a_j$ , equals  $Ae_j$ . So, the jth column of Q equals  $Qe_j$ . Now, using  $e_0$  as an example,

$$q_{0} = Qe_{0} = P(Pe_{o}) = \begin{pmatrix} 0.4 & 0.3 & 0.1 \\ 0.4 & 0.3 & 0.6 \\ 0.2 & 0.4 & 0.3 \end{pmatrix} \begin{pmatrix} 0.4 & 0.3 & 0.1 \\ 0.4 & 0.3 & 0.6 \\ 0.2 & 0.4 & 0.3 \end{pmatrix} \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}$$
$$= \begin{pmatrix} 0.4 & 0.3 & 0.1 \\ 0.4 & 0.3 & 0.6 \\ 0.2 & 0.4 & 0.3 \end{pmatrix} \begin{pmatrix} 0.4 \\ 0.4 \\ 0.2 \end{pmatrix} = \begin{pmatrix} 0.3 \\ 0.4 \\ 0.3 \end{pmatrix}$$

The other columns of Q can be computed similarly:

		Today		
		sunny	cloudy	rainy
Day after Tomorrow	sunny	0.30	0.25	0.25
	cloudy	0.40	0.45	0.40
	rainy	0.30	0.30	0.35

Submit

Answers are displayed within the problem

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