Homework 15

Due Tuesday, August 4th at the beginning of class

1. (From DeGroot) The joint PMF of $X, Y$ are given by the following table:

<table>
<thead>
<tr>
<th>$X$</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.08</td>
<td>0.07</td>
<td>0.06</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>1</td>
<td>0.06</td>
<td>0.10</td>
<td>0.12</td>
<td>0.05</td>
<td>0.02</td>
</tr>
<tr>
<td>2</td>
<td>0.05</td>
<td>0.06</td>
<td>0.09</td>
<td>0.04</td>
<td>0.03</td>
</tr>
<tr>
<td>3</td>
<td>0.02</td>
<td>0.03</td>
<td>0.03</td>
<td>0.03</td>
<td>0.04</td>
</tr>
</tbody>
</table>

Determine the following:

(a) $P(Y > 2)$
(b) $P(X \leq 2 \text{ and } Y \leq 2)$
(c) $P(X > Y)$.
(d) $P(X = 3|Y = 3)$.

2. (From DeGroot) Suppose that the joint PDF of two random variables $X$ and $Y$ is as follows:

$$ f(x, y) = \begin{cases} c(x^2 + y) & \text{for } 0 \leq y \leq 1 - x^2, \\ 0 & \text{otherwise.} \end{cases} $$

(a) What is $c$?
(b) Determine $P(0 \leq X \leq 1/2)$.
(c) Determine $P(Y \leq X + 1)$.
(d) Determine $P(Y = X^2)$. 

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