Probability And Mathmatical Statistics
Homework 4

151220131 谢旻晖

1.

a

$$
\begin{aligned}
&P(X=Y)\\
&=\sum_{k=1}^{+\infty}P(X=Y=k)\\
&=\sum_{k=1}^{+\infty}P(X=k)P(Y=k)\\
&=\sum_{k=1}^{+\infty}\left((1-p)\left(1-q\right)\right)^{k-1}pq\\
&=\frac{pq}{p+q-pq}
\end{aligned}
$$

b

$$
\begin{aligned}
&P(\min\left(X,Y\right)=k)\\
&=\sum_{i=k}^{+\infty}P(X=k,Y=i)+P(X=i,Y=k)-P(X=i,Y=i)\\
&=(p+q)(1-p)^{k-1}(1-q)^{k-1}-\frac{pq((1-p)(1-q))^{k-1}}{p+q-pq}\\
&=(p+q-\frac{pq}{p+q-pq})(1-p)^{k-1}(1-q)^{k-1}
\end{aligned}
$$