10.

$X\mid Y=1$	0	1
$P(X\mid Y=1)$	$\frac{1}{4}$	$\frac{3}{4}$

$X\mid Y\neq 1$	0	1
$P(X\mid Y\neq 1)$	$\frac{1}{2}$	$\frac{1}{2}$

$\frac{(n-1)!}{(n-r)!\cdot r!}$

$-\frac{x^3}{2}e^{-x-xy}$

11. $P(X_i=1\mid X_1+X_2+\dots+X_n=r)=\frac{p\cdot C_{n-1}^{r-1}\cdot p^{r-1}\cdot(1-p)^{n-r}}{C_n^r p^r(1-p)^{n-r}}=\frac{r}{n}$

$\therefore P(X_i=0\mid X_1+X_2+\dots+X_n=r)=1-\frac{r}{n}$

$X_i\mid X_1+X_2+\dots+X_n=r$	0	1
$P(X_i\mid X_1+X_2+\dots+X_n=r)$	$1-\frac{r}{n}$	$\frac{r}{n}$

14. (1) $f_X(x)=\int_0^{\infty}\frac{x^3}{2}e^{-x-xy}dy=\frac{x^2}{2}e^{-x}$, $x>0$

$f_X(x)=0$, $x\le 0$

(2) $f_{Y|X}(y\mid x)=\frac{f(x,y)}{f_X(x)}=\begin{cases}xe^{-xy}, & x,y>0\\ 0 & \text{其它}\end{cases}$

$f_{Y|X}(y\mid X=0.5)=\begin{cases}0.5e^{-0.5y}, & y>0\\ 0, & \text{其它}\end{cases}$

$-e^{-y0.5y}$

(3) $P(Y\ge 1\mid X=0.5)=\int_1^{\infty}f_{Y|X}(y\mid x=0.5)dy=e^{-0.5}$

15. (1) $f(x,y)=f_X(x)\cdot f_{Y|X}(y\mid x)=\frac{1+xy}{3}$, $0<x<2$, $0<y<1$

$f(x,y)=0$, 其他

(2) $f_Y(y)=\int_0^2\frac{1+xy}{3}dx=\frac{2}{3}+\frac{2}{3}y$, $0<y<1$

$f_Y(y)=0$, 其他

(3) $f_{X|Y}(x\mid y)=\frac{f(x,y)}{f_Y(y)}=\frac{1+xy}{2+2y}$, $0<x<2$, $0<y<1$

$f_{X|Y}(x\mid y)=0$, 其他

$\frac{4}{5}x+\frac{6}{5}y$ $\frac{3}{5}y^2+\frac{4}{5}xy$ $\frac{3}{5}x+\frac{2}{5}x^2$ $0.6-0.48$ 0.4×0.6

16. (1) $f_X(x)=\int_0^1 f(x,y)dy=\frac{3}{5}+\frac{4}{5}x$, $0\le x\le 1$

$f_X(x)=0$, 其他

$P(X>0.8)=\int_{0.8}^1(\frac{3}{5}+\frac{4}{5}x)\,dx=0.264$

(2) $f_{X|Y}(x|y)=\frac{f(x,y)}{f_Y(y)}=\frac{2x+3y}{3y+1}$, $0\le y\le 1$ $\frac{4}{5}x+\frac{6}{5}y$

$f_Y(y)=\int_0^1 f(x,y)\,dx=\frac{6}{5}y+\frac{2}{5}$, $0\le y\le 1$

$f_Y(y)=0$, 其他

(3) $P(0.6\le X\le 0.8|Y=0.3)=\int_{0.6}^{0.8}\frac{19}{10}\cdot(2x+\frac{9}{10})\,dx=0.874$

0.91

补: $(X,Y)\sim N(1,2;3,4;-0.3)$

则 $X\sim N(1,2)$, $P(X<2)=\Phi(\frac{2-1}{\sqrt{2}})=\Phi(0.707)=0.7794$

$Y|X=2\sim N(3-0.3\cdot\sqrt{2}\cdot(2-1),\ 0.91\times 4)=N(2.576,\ 3.64)$

$P(Y<4|X=2)=\Phi(\frac{4-2.576}{\sqrt{3.64}})=0.773$