3. Multinomial, $n = 10$, $p_1 = p_2 = p_3 = 1/3$

7. $f_{XY}(x, y) = \alpha\beta \exp[-\alpha x - \beta y]$; $f_x(x) = \alpha \exp[-\alpha x]$, $f_Y(y) = \beta \exp[-\beta y]$

9. a. $f_X(x) = 3(1 - x^2)/4$, $-1 \le x \le 1$, $f_Y(y) = 3\sqrt{1 - y}/2$, $0 \le y \le 1$
   b. $f_{X|Y}(x|y) = 1/(2\sqrt{1 - y})$, $f_{Y|X}(y|x) = 1/(1 - x^2)$

11. ~~1/9~~

13. $p(0) = 1/2$, $p(1) = p(2) = 1/4$

15. a. $c = 3/2\pi$ **c.** $\dfrac{2\sqrt{2} - 1}{2\sqrt{2}}$

   d. $f_Y(y) = \frac{3}{2}(1 - y^2)$, $-1 \le y \le 1$
   $f_X(x) = \frac{3}{2}(1 - x^2)$, $-1 \le x \le 1$
   X and Y are not independent.

   e. $f_{Y|X}(y|x) = \dfrac{\sqrt{1 - x^2 - y^2}}{\pi(1 - x^2)}$

   $f_{X|Y}(x|y) = \dfrac{\sqrt{1 - x^2 - y^2}}{\pi(1 - y^2)}$

17. b. $f_X(x) = 1 - |x|$, $-1 \le x \le 1$; $f_Y(y) = 1 - |y|$, $-1 \le y \le 1$
   c. $f_{X|Y}(x|y) = 1/(2 - 2|y|)$, $1 - |y| \le x \le 1 + |y|$
   $f_{Y|X}(y|x) = 1/(2 - 2|x|)$, $1 - |x| \le y \le 1 + |x|$

19. a. $\beta/(\alpha + \beta)$ **b.** $\beta/(2\alpha + \beta)$

23. Binomial (m, pr)

29. $h(x, y) = \lambda\mu e^{-\lambda x}e^{-\mu y}[1 + \alpha(1 - 2e^{-\lambda x})(1 - 2e^{-\mu y})]$

33. a. $f_{\Theta|N}(\theta|n) = n(n + 1)\theta(1 - \theta)^{n-1}$

43. $f_S(s) = s$ for $0 \le s \le 1$ and $= 2 - s$ for $1 \le s \le 2$

49. $\lambda e^{-\lambda S/2} - \lambda e^{-\lambda S}$ **53.** $5/9$

55. $f_{XY}(x, y) = (x^2 + y^2)^{-1/2}$, $x^2 + y^2 \le 1$

57. $x_1 = y_1$; $x_2 = -y_1 + y_2$

61. $f_{UV}(u, v) = \dfrac{1}{bd} f_{XY}\left(\dfrac{u - a}{b}, \dfrac{v - c}{d}\right)$

63. a. $f_{UV}(u, v) = \dfrac{1}{2} f_{XY}\left(\dfrac{u + v}{2}, \dfrac{u - v}{2}\right)$ where $U = X + Y$, $V = X - Y$

   b. $f_{UV}(u, v) = \dfrac{1}{2|v|} f_{XY}((uv)^{1/2}, (u/v)^{1/2})$ where $U = XY$, $V = X/Y$

67. $f(t) = n(n - 1)\lambda[\exp(-(n - 1)\lambda t) - \exp(-n\lambda t)]$