5.1 7, 10, 16, 18, 25, 27, 28, 38
5.2 1, 17, 21, 37

7. (a) $p(n) = \frac{1}{6}\left(\frac{5}{6}\right)^{n-1}$

(b) $P(T>3) = \left(\frac{5}{6}\right)^3 = \frac{125}{216}$

(c) $P(T>6 \mid T>3) = \left(\frac{5}{6}\right)^3 = \frac{125}{216}$.

10. (a) $h(N, n_1, n_2, k) = \dfrac{\binom{n_1}{k}\binom{N-n_1}{n_2-k}}{\binom{N}{n_2}}$

(b) $X = n_{12} = k$, find maximum $\dfrac{h(N+1, n_1, n_2, n_{12})}{h(N, n_1, n_2, n_{12})}$

Thus $N = \dfrac{n_1 n_2}{n_{12}}$.

16. $\lambda = np = 5 \cdot 60^2 \cdot 0.01 = 180sec = 3$ minutes.

$P(X=k) = \dfrac{e^{-3}3^k}{k!} \Rightarrow \dfrac{e^{-3} \cdot 3^1}{1!} + \dfrac{e^{-3} \cdot 3^0}{0!} = \dfrac{4}{e^3}$

18. (a) $p = \frac{1}{500}$, $n = 600$, $\lambda = n \cdot p = \frac{600}{500}$

$P(X=0) = e^{-\lambda} = 0.3012$.

(b) $p = \frac{1}{500}$, $n = 400$, $\lambda = n \cdot p = \frac{400}{500}$

$P(Y=2) = \dfrac{e^{-\lambda}\lambda^2}{2!} = 0.1437$

(c) $P(X+Y=2) = P(X=0, Y=2) + P(X=1, Y=1) + P(X=2, Y=0) = 0.595$.

25. $2\frac{5^2 e^{-5}}{2!} + (2+5)\frac{5^3 e^{-5}}{3!} + \cdots + (2+5\cdot 98)\frac{5^{100} e^{-5}}{100!} = 17.155$

$2\binom{100}{2}(0.05)^2(0.95)^{98} + 7\binom{100}{3}(0.05)^3(0.95)^{97} + \cdots = 17.141$

27. $m = 100 \times 0.001 = 0.1$. $P(\text{at least one accident}) = 1 - e^{-0.1}$
$= 0.0952$

28. Let X be people who didn't show up.

$P(X \geq 2) = 1 - P(X=0) - P(X=1)$.

38.

(a). $P(X=1) = \binom{5}{1} \cdot \left(\frac{5}{20}\right)^1 \cdot \left(\frac{15}{20}\right)^4 = 0.3955$

(b). $P(X=1) = h(20,5,5,1) = \frac{\binom{5}{1}\binom{20-5}{5-1}}{\binom{20}{5}} = 0.4402$.

5.2 (1). a. $f(x) = 1$ on $[2,3)$, $F(x) = x-2$, on $[2,3]$

b. $f(x) = \frac{1}{3} x^{-2/3}$ on $[0,1]$, $F(x) = x^{\frac{1}{3}}$ on $[0,1]$

17. (a) $f(x) = \begin{cases} \frac{\pi}{2}\sin(\pi x), & 0 \leq x \leq 1 \\ 0, & \text{else.} \end{cases}$ (b) $\sin^2(\frac{\pi}{8}) = 0.146$.

21. $P(Y \leq y) = P(F(X) \leq y) = P(X \leq F^{-1}(y)) = F(F^{-1}(y)) = y$ on $[0,1]$.

37. $F_Y(y) = \frac{1}{\sqrt{2\pi}y} e^{-\frac{\log^2(y)}{2}}$ for $y > 0$.