A

5.3(38.41)

a.

$T_0 = 0, 1, 2, 3, 4$

$P(T_0=0) = 0.2\times0.2 = 0.04$

$P(T_0=1) = (0.2\times0.5)\times2 = 0.2$

$P(T_0=2) = 0.5\times0.5+(0.3\times0.2)\times2 = 0.37$

$P(T_0=3) = 0.3$

$P(T_0=4) = 0.3\times0.3 = 0.09$

| $T_0$ | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| $P(T_0)$ | 0.04 | 0.2 | 0.37 | 0.3 | 0.09 |

b.

$\mu_{T_0} = 0.04\times0+0.2\times1+0.37\times2+0.3\times3+0.09\times4$

$= 2.2 = 2\mu$

c. $\sigma^2_{T_0} = (T_0-\mu_{T_0})^2\cdot P(T_0) = 0.98 = 2\sigma^2$

$\cancel{E(T_0) = (0.04)^2\times0 + (0.2\times0.04)\times2\times1 +}$

$\cancel{[(0.2\times0.2)+(0.37\times0.04)\times2]\times2 +}$

$\cancel{[(0.2\times0.37\times2)+(0.3\times0.04\times2)]\times3}$

d.

$E(T_0) = 2\mu_{T_0} = 4.4$

$\sigma^2(T_0) = 2\sigma^2_{T_0} = 1.96$

e.

$P(T_0=8) = (0.09)^2 = 0.0081$

$P(T_0=7) = \cancel{(0.3\times0.09)^2 = 0.002916}\ 0.3\times0.09\times2 = 0.054$

$P(T_0\geq7) = 0.0081 + 0.002916 = 0.0621$

4.

a.

$\cancel{\mu_X = 1\times0.4+2\times0.3+3\times0.2+4\times0.1=2}$

$\cancel{\bar{X} = 2\mu_X = 4}$

b.

41.

a.

| $x_1$ | $x_2$ | $P(x_1, x_2)$ | $\bar{x}$ |
|---|---|---|---|
| 1 | 1 | 0.16 | 1 |
| 1 | 2 | 0.12 | 1.5 |
| 1 | 3 | 0.08 | 2 |
| 1 | 4 | 0.04 | 2.5 |
| 2 | 1 | 0.12 | 1.5 |
| 2 | 2 | 0.08 | 2 |
| 2 | 3 | 0.06 | 2.5 |
| 2 | 4 | 0.03 | 3 |
| 3 | 1 | 0.08 | 2 |
| 3 | 2 | 0.06 | 2.5 |
| 3 | 3 | 0.04 | 3 |
| 3 | 4 | 0.02 | 3.5 |
| 4 | 1 | 0.04 | 2.5 |
| 4 | 2 | 0.03 | 3 |
| 4 | 3 | 0.02 | 3.5 |
| 4 | 4 | 0.01 | 4 |

| $\bar{x}$ | 1 | 1.5 | 2 | 2.5 | 3 | 3.5 | 4 |
|---|---|---|---|---|---|---|---|
| $P(\bar{x})$ | 0.16 | 0.24 | 0.25 | 0.2 | 0.1 | 0.04 | 0.01 |

b.

$P(\bar{x} \le 2.5)$

$= 0.2 + 0.25 + 0.24$

$+ 0.16 = 0.85$

b.

c.

| $r$ | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| $P(r)$ | 0.3 | 0.4 | 0.22 | 0.08 | |

d. for $n=2$

$P(\bar{x} \le 1.5) = 0.16 + 0.24 = \cancel{0.4}\ 0.4$

for $n=4$

$P(\bar{x} \le 1.5) = \cancel{0.16}\ P(\bar{x}=1)^2 + 2P(\bar{x}=1)\cdot P(\bar{x}=1.5) + P(\bar{x}=1.5)^2 + 2P(\bar{x}=1)\cdot P(\bar{x}=2)$

$= 0.24$

5.4 (46, 51)

46. $\mu = 12$ $\quad \sigma = 0.04$

a. $E(\bar{x}) = \mu = 12$

$\cancel{V(\bar{x}) = \frac{\sigma^2}{\sqrt{16}} = 0.001}$ $\cancel{0.01}$

$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{16}} = 0.01$

b.

b.

$E(\bar{x}) = \mu = 12$

$\sigma_{\bar{x}} = \frac{6}{\sqrt{64}} = 0.005$

c. part (b), because part (b) has a smaller $\sigma_{\bar{x}}$ and it's size is larger than "$\alpha$".

~~5b.~~

~~To has a normal distribution with~~

$\cancel{\mu_{T_0} = n\mu = 20}$

$\cancel{\sigma_{T_0}^2 = n\sigma^2 = 8}$

$\cancel{P(T_0 \le 11) = P(Z \le \frac{11-20}{8})}$

51. for day 1. $n=5$, $\sigma_{\bar{x}} = \frac{2}{\sqrt{5}}$

$P(\bar{x} \le 11) = P(Z \le \frac{11-10}{2/\sqrt{5}}) = 0.8686$

for day 2. $n=6$, $\sigma_{\bar{x}} = \frac{2}{\sqrt{6}}$

$P(\bar{x} \le 11) = P(Z \le \frac{11-10}{2/\sqrt{6}}) = 0.8888$

55. $\mu=\lambda=50$. $E(x)=V(x)=50$

a. $P(35\le \bar{X}\le 70) = P(\frac{35-50}{\sqrt{50}} \le z \le \frac{70-50}{\sqrt{50}}) =$

b. $n=5$

$P(225\le T_0\le 275) = P(\frac{225-250}{\sqrt{5}\sqrt{50}} \le z \le \frac{275-250}{\sqrt{5}\sqrt{50}}) =$

5.5 (58, 70.73).

68.

a.

$E(X_1+X_2+X_3) = 27\times200+125\times250+512\times100 = 87850$

$V(X_1,X_2,X_3) = 27^2\times10^2+(125)^2\times12^2+(512)^2\times8^2=$

b. the expected value is still correct but variance will be not correct because

70.

a.

$E(Y_i) = 0.5$

$E(W) = \frac{n(n+1)}{4}$

b. $V(Y_i) = 0.25$

$V(W) = \frac{1}{4} \times \frac{n(n+1)(2n+1)}{6} = \frac{n(n+1)(2n+1)}{24}$

73.

a. ~~boo~~

according The central limit theorem

b.

$\cancel{E(X-Y) = 40-35 = 5}$

$\surd$

$\mu_{\bar{x}} = 105, \ \mu_{\bar{y}} = 100$

$\mu_{\bar{x}-\bar{y}} = 105 - 100 = 5$

$\sigma_{\bar{x}-\bar{y}} = \frac{8}{\sqrt{100}} + \frac{6}{\sqrt{125}} = 1.621$

$P(-1 \le \bar{x}-\bar{y} \le 1) = P(\frac{-1-5}{1.621} \le Z \le \frac{1-5}{1.621})$

d.

$P(\bar{x}-\bar{y} \ge 10)$

$= P(Z \ge \frac{10-5}{1.621}) = 0.01$