A

38.

a. Since the possible value of X_1 and X_2 is 0, 1, 2, the possible value of T_0 is 0, 1, 2, 3, 4

$P(T_0=0) = P(X_1=0)\cdot P(X_2=0) = 0.04$

$P(T_0=1) = P(X_1=0)\cdot P(X_2=1)$ or $P(X_1=1)\cdot P(X_2=0) = 0.2$

$P(T_0=2) = 0.25 + 2\times 0.06 = 0.37$

$P(T_0=3) = 0.15\times 2 = 0.3$

$P(T_0=4) = 0.09$

pmf of T_0 is as follows:

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

b. $\mu_{T_0} = 0\cdot(0.04) + 1\cdot(0.2) + 2\cdot(0.37) + 3\cdot(0.3) + 4\cdot(0.09)$

$= 2.2 = 2\mu$

c. $\mu_{T_0^2} = 0^2\cdot(0.04) + 1^2\cdot(0.2) + 2^2\cdot(0.37) + 3^2\cdot(0.3) + 4^2\cdot(0.09)$

$= 5.82$

$\sigma^2_{T_0} = \mu_{T_0^2} - \mu^2_{T_0}$

$= 5.82 - (2.2)^2$

$= 0.98 = 2\sigma^2$

$= 0.98 = 2\sigma^2$

d. since from b.c we can get that $E(T_0) = 4\mu = 4.4$

$V(T_0) = 4\sigma^2 = 1.96$

e. $P(T_0 = 8) = (0.3)^4 = 0.0081$

$P(T_0 = 7) = 4\times(0.5\times0.3\times0.3\times0.3)$

$= 0.054$

$P(T_0 \ge 7) = P(T_0 = 7) + P(T_0 = 8)$

$= 0.0621$

41.

a. $\bar{x} = 1, 1.5, 2, 2.5, 3, 3.5, 4$

$P(\bar{x} = 1) = 0.4\times0.4 = 0.16$

$P(\bar{x} = 1.5) = 2\times0.4\times0.3 = 0.24$

$P(\bar{x} = 2) = (0.3)^2 + 2\times0.4\times0.2 = 0.25$

$P(\bar{x} = 2.5) = 2\times0.3\times0.2 + 2\times0.4\times0.1$

$= 0.20$

$P(\bar{x} = 3) = (0.2)^2 + 2\times0.3\times0.1 = 0.1$

$P(\bar{x} = 3.5) = 2\times0.2\times0.1 = 0.04$

$P(\bar{x} = 4) = (0.1)^2 = 0.01$

The pmf of $\bar{x}$

$\bar{x}$	1	1.5	2	2.5	3	3.5	4
$p(\bar{x})$	0.16	0.24	0.25	0.20	0.1	0.04	0.01

b. $P(\bar{x} \le 2.5) = 1 - P(\bar{x} > 2.5)$

$= 1 - 0.1 - 0.04 - 0.01$

$= 0.85$

c. The pmf of R

r	0	1	2	3
p(r)	0.3	0.4	0.22	0.08

d. $p(\bar{x} \le 1.5)$

$= C_4^0 (0.4)^4 + C_4^1 (0.4)^3 \times 0.3$

$+ C_4^2 (0.4)^2 \times (0.3)^2 + C_4^3\, 0.4 \times (0.3)^3$

$= 0.24$

5.4 46 51 55

46. a. The sampling distribution of $\bar{x}$ is still centered at 12 cm

$\sigma_{\bar{x}} = \frac{0.04}{\sqrt{16}} = 0.01$ cm

b. mean value is also 12cm

$\sigma_{\bar{x}} = \frac{0.04}{\sqrt{64}} = 0.005$

c. The second one

because the variation is smaller

n is larger.

because the variation is smaller
n is larger.

51. for day 1

$$P(X \le 11) = P\left(Z \le \frac{11-10}{2/\sqrt{5}}\right)$$

$$= P(Z \le 1.12)$$

$$= 0.8686$$

for day 2

$$P(X \le 11) = P\left(Z \le \frac{11-10}{2/\sqrt{6}}\right)$$

$$= P(Z \le 1.22$$

$$= 0.8888$$

$$P_n(X \le 11) = (0.8686)\cdot(0.8888)$$

$$= 0.7720$$

55.

a. $M = \lambda = 50 \quad E(X) = V(X) = 50$

$$P(35 \le T_0 \le 70) = P\left(\frac{35-50}{\sqrt{50}} \le Z \le \frac{70-50}{\sqrt{50}}\right.$$

b. $n = 5$

$$P(225 \le T_0 \le 275 = P\left(\frac{225-250}{5/\sqrt{50}} \le Z \le \frac{275-250}{5/\sqrt{50}}\right)$$

58. a. $E(27X_1 + 125X_2 + 512X_3)$

$$= 27E(X_1) + 125E(X_2) + 512E(X_3)$$

$$= 87850$$

$$V(27X_1 + 125X_2 + 512X_3)$$

$$= 27^2 V(X_1) + 125^2 V(X_2) + 512^2 V(X_3)$$

$$= 19100116$$

4

b. $V(Y_i) = \frac{1}{4}$ $\quad V(W) = \sum_{i=1}^{n} i^2 V(Y_i)$

$$= \frac{n(n+1)(2n+1)}{24}$$

73. a. both are approximately normal by the Central Limit Theorem.

b. $\mu_{\bar{X}-\bar{Y}} = 5$

$$\sigma_{\bar{X}-\bar{Y}} = \sqrt{\frac{8^2}{40} + \frac{6^2}{35}} = 1.621$$

c. $P(-1 \le \bar{X} - \bar{Y} \le 1) \approx P\left(\frac{-1-5}{1.6213} \le Z \le \frac{1-5}{1.6213}\right)$

$= P(-3.70 \le Z \le -2.47)$

≈ 0.0068

d. $P(\bar{X} - \bar{Z} \ge 10) \approx P\left(Z \ge \frac{10-5}{1.6213}\right)$

$= P(Z \ge 3.08)$

$= 0.0010$

It is too small that if $\mu_1 - \mu_2 = 5$, we would thus doubt this claim.