Section 5.3

Ex 38

B+

a.

T_0	0	1	2	3	4
$P_{(T_0)}$	0.04	0.2	0.37	0.2	0.09

b. $\mu_{T_0} = \mu \cdot n = 2.2$

c. $V(T_0) = n V(x)^2 = 2 \times 0.49 = 0.98$

d. now $n = 4$,

$E(T_0) = n\mu = 4.4$;

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

e. X is satisfy normal distribution.

$p(T_0 = 8) = p(z = \frac{8-4.4}{1.4}) = p(z = 2.57) = 0.9949$

$p(T_0 \geq 7) = p(z \geq \frac{7-4.4}{1.4}) = p(z \geq 1.85) = 1 - \Phi(1.85) = 1 - 0.9678 = 0.0322$

Ex 41

a.

X_1+X_2	2	3	4	5	6	7	8
$p(\bar{x})$	0.16	0.24	0.25	0.2	0.1	0.04	0.01
$\bar{x}$	1	1.5	2	2.5	3	3.5	4

b. $\mu_{\bar{x}} = \sum_{i=2}^{8} \bar{x}\, p(\bar{x}) = 2$

$\sigma_{\bar{x}} = \sqrt{\sum_{i=2}^{8} (\bar{x}^2 p(x) - \mu^2)} = 0.707$

$p(\bar{x} \leq 2.5) = p(Z \leq \frac{2.5-2}{0.707}) = 0.75$

c.

R	0	1	2	3
$p(R)$	0.3	0.4	0.22	0.08

d. ~~Assume that $T_0 = X_1+X_2+X_3+X_4$, $E(T_0) = n\mu$~~

$p(\bar{x} \leq 1.5) = p(1,1,1,1) + p(2,1,1,1) + p(2,2,1,1) + p(3,1,1,1) = (0.4)^4 + 4(0.4)^3(0.3) + 6(0.4)^2(0.3)^2 + 4(0.4)^3(0.2) = 0.24$

Section 5.4

Ex 46. a. $\bar{x}$ is satified normally distribution.

$\sigma_{\bar{x}} = \frac{\sigma_x}{\sqrt{n}} = \frac{0.04}{4} = 0.01$

b. $\bar{x}$ is satisfied normal distribution $\sigma_{\bar{x}} = \frac{0.04}{8} = 0.005$

c. The second sample. Because with the larger sample, comes with the lower variability we know $\mu = 10$ $\sigma = 2$, so $\mu_{\bar{x}} = \mu = 10$, $\sigma_{\bar{x}} = \frac{\sigma_x}{\sqrt{n}} = \frac{2}{\sqrt{5}}$ or $\frac{2}{\sqrt{6}}$

for day one: $p(\bar{x}_1 \le 11) = p(z \le \frac{(11-10)\sqrt{5}}{2}) = 0.86$

for day two $p(\bar{x}_2 \le 11) = p(z \le \frac{(11-10)\sqrt{6}}{2}) = 0.88$

for average $p(\bar{x} \le 11) = 0.86 \times 0.88 = 0.7720$

Ex 55

a. for possion distribution, $\mu = \sigma = 50$

$p(35 \le \bar{x} \le 50) = p(\frac{35-50}{50} \le z \le \frac{35-50}{50}) = p(-0.3 \le z \le 0.4) = 0.5160 - 0.4880 = 0.028$

b. the daily mean is 50, so the five day mean is ~~250~~ $\mu = 250$, so ~~σ~~ $\sigma = \mu = 250$

$p(225 \le \bar{x} \le 275) = p(\frac{225-250}{250} \le z \le \frac{275-250}{250}) = p(-0.58 \le z \le 0.58) = 0.719 - 0.4681 = 0.2509$

Section 5.5

Ex 58

(1) $E(x) = 27 \times 200 + 125 \times 250 + 512 \times 100 = 87850$

$V(x) = 27^2 \times 10^2 + 125^2 \times 12^2 + 512^2 \times 8^3 = 19100116$

(2) the expected value is correct

the ~~variance~~ variance is incorrect, because the covariance ~~covariance~~ also contribute the variance

Ex 70

(1) $E(Y_i) = 0.5$, $E(W) = \sum_{i=1}^{n} 0.5(1+\cdots n) = 0.5 \times \frac{n(n+1)}{2} = \frac{n(n+1)}{4}$

(2) $V(Y_i) = E(Y_i^2) - E(Y_i)^2 = 0.25$, ~~so~~ $V(W) = V(Y_i) \cdot \sum_{i=1}^{n} i^2 = \frac{n(n+1)(2n+1)}{24}$

Ex 73

a. given that the sample value is relatively large, so ~~the C.L.T~~ $\bar{x}$ and $\bar{y}$ is normally distribute.

b. $\bar{x}$ and $\bar{y}$ is just special linear conbination, so it is also normally distribution

c. $\mu_{\bar{x}-\bar{y}} = 5$, $\sigma^2_{\bar{x}-\bar{y}} = \frac{8^2}{40} + \frac{6^2}{35} = 2.629$, $\sigma = 1.621$, $p(-1 \le \bar{x}-\bar{y} \le 1) = p(-3.7 \le z \le -2.47) = 0.0068$

d. $p(\bar{x}-\bar{y} \ge 10) = p(z \ge \frac{10-5}{1.621}) = p(z \ge 3.08) = 0.001$, this is two small, so it's doubtful