$$= \frac{1}{49}\left\{\sum_{X_i=0}(X_i-\overline{X})^2+\sum_{X_i=1}(X_i-\overline{X})^2+\sum_{X_i=2}(X_i-\overline{X})^2+\sum_{X_i=3}(X_i-\overline{X})^2+\sum_{X_i=4}(X_i-\overline{X})^2+\sum_{X_i=5}(X_i-\overline{X})^2\right\} =$$

3.4.1 大きい標本による母平均の区間推定

[1] 題意より 母平均μの95%信頼区間は

$$\overline{X}-\frac{S}{\sqrt{n}}\cdot z(0.025)<\mu<\overline{X}+\frac{S}{\sqrt{n}}\cdot z(0.025)$$

ここで、$n=100$, $\overline{X}=121.1$, $S=6.8$, $z(0.025)=1.96$

$\therefore 119.76<\mu<122.43$

X_i = i番目の区画で発芽した種子の数とすると

$\overline{X}=\frac{1}{n}\sum_{i=1}^{n}X_i$, $S^2=\frac{1}{n-1}\sum_{i=1}^{n}(X_i-\overline{X})^2$

[2] 題意より 母平均μの95%信頼区間は

$$\overline{X}-\frac{S}{\sqrt{n}}\cdot z(0.025)<\mu<\overline{X}+\frac{S}{\sqrt{n}}\cdot z(0.025)$$

ここで、$n=50$, $z(0.025)=1.96$

$$= \frac{1}{50}\left\{\sum_{X_i=0}X_i+\sum_{X_i=1}X_i+\sum_{X_i=2}X_i+\sum_{X_i=3}X_i+\sum_{X_i=4}X_i+\sum_{X_i=5}X_i\right\}=$$

$$\overline{X}=\frac{1}{50}(0\times5+1\times14+2\times16+3\times8+4\times5+5\times2)=2.0$$

$$S^2=\frac{1}{49}\left\{(0-2)^2\times5+(1-2)^2\times14+(2-2)^2\times14+(3-2)^2\times8+(4-2)^2\times5+(5-2)^2\times2\right\}$$

$\fallingdotseq 1.63$.

$\therefore S\fallingdotseq 1.28$ $\quad\therefore 2-\overbrace{\frac{1.28}{\sqrt{50}}\times1.96}^{0.36}<\mu<2+\frac{1.28}{\sqrt{50}}\times1.96$

$\therefore 1.64<\mu<2.36$ $\quad\therefore 1.6<\mu<2.4$

[3] 題意より 母平均μの95%信頼区間は

$$\overline{X}-\frac{S}{\sqrt{n}}\cdot z(0.025)<\mu<\overline{X}+\frac{S}{\sqrt{n}}\cdot z(0.025)$$

ここで $n=100$, $z(0.025)=1.96$

$$\overline{X}=\frac{1}{100}(0\times12+1\times23+2\times26+3\times18+4\times12+5\times6+6\times3)=2.25$$

$$S^2=\frac{1}{99}\left\{(0^2\times12+1^2\times23+2^2\times26+3^2\times18+4^2\times12+5^2\times6+6^2\times3)-100\times2.25^2\right\}\fallingdotseq 2.35$$

$\therefore 2.25-\underbrace{\frac{\sqrt{2.35}}{10}\times1.96}_{\fallingdotseq\,0.30}<\mu<2.25+\frac{\sqrt{2.35}}{10}\times1.96$ $\quad\therefore 1.95<\mu<2.55$

$\therefore 2.0<\mu<2.6$