概统作业 (Week 15)

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此检验犯第二类错误的概率为

$$\alpha_{2\Psi}(\theta) = 1 - \beta_{\Psi}(\theta) = 1 - P_{\theta=\theta_1}\{X_1 = X_2 = X_3 = 1\} = 1 - \theta_1^6.$$

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(1) 有最大似然函数

$$L(X_1, X_2, \dots, X_n; p) = \prod_{i=1}^{n} p(1-p)^{k-1} = p^{130}(1-p)^{233}$$

$$\ln L = 130 \cdot \ln p + 233 \cdot \ln(1-p)$$

令

$$\frac{\partial \ln L}{\partial p} = \frac{130}{p} + \frac{233}{1-p} = 0.$$

得

$$\hat{p} = -\frac{130}{103} \approx -1.262$$

检验二阶导

$$\frac{\partial^2 \ln L}{\partial p^2} = -\frac{130}{p^2} + \frac{233}{(1-p)^2}$$

当 $p = \hat{p}$ 时，二阶偏导为负，故所求驻点为 L 极大值点，最大似然估计为

$$\hat{p} = -\frac{130}{103} \approx -1.262$$

(2)

3

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