

電腦概論與程式設計: 作業 (8)

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1. For what values of a, m and b does the function

$$f(x) = \begin{cases} 3, & x = 0 \\ -x^2 + 3x + a, & 0 < x < 1 \\ mx + b, & 1 \leq x \leq 2 \end{cases}$$

satisfy the hypothesis of the Mean Value Theorem on the interval $[0, 2]$?

2. If the curve $r = f(\theta)$ passes through the origin at $\theta = \theta_0$, then $f(\theta_0) = 0$ and the slope equation gives

$$\left. \frac{dy}{dx} \right|_{(0, \theta_0)} = \frac{f'(\theta_0) \sin \theta_0}{f'(\theta_0) \cos \theta_0} = \tan \theta_0.$$

- 3.

$$\begin{pmatrix} a & b & c \\ d & e & f \\ g & h & i \end{pmatrix} \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} \alpha \\ \beta \\ \gamma \end{pmatrix}$$

4. If the parameter s measures arc length from P_0 in the direction of \vec{u} , we find the rate of change of f at P_0 in the direction of \vec{u} by calculating df/ds at P_0 .

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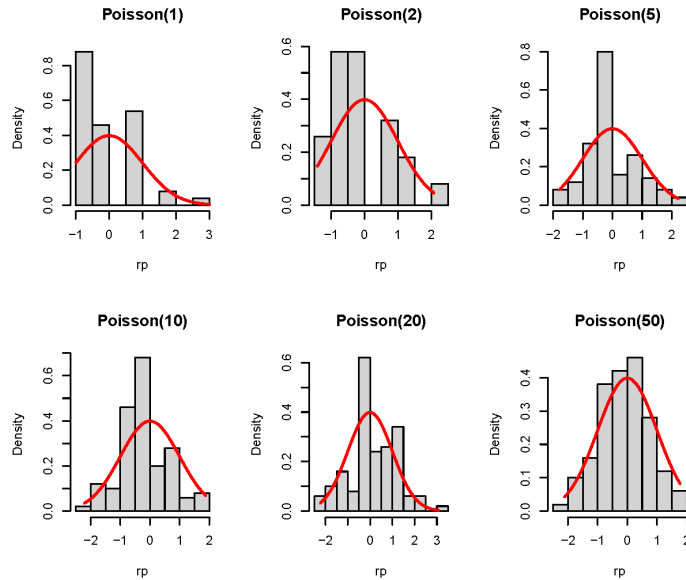
5. 以常態分佈逼近布瓦松 (Poisson) 分佈¹

Normal Approximation to Poisson Distribution 的定理如下:

$$\text{If } X \sim \text{Poisson}(\lambda) \text{ then } \frac{X - \lambda}{\sqrt{\lambda}} \xrightarrow{d} \text{Normal}(0, 1) \text{ for a sufficient large } \lambda.$$

使用 $\lambda = 1, 2, 5, 10, 20, 50$ 重覆下列步驟來驗證。(共 6 個圖，請畫成一頁 2×3 。)

- 隨機產生 100 個 $\text{Poisson}(\lambda)$ 隨機數，將資料利用 $\frac{x - \lambda}{\sqrt{\lambda}}$ 轉換後，畫出其直方圖 (圖標題是 $\text{Poisson}(\lambda)$ ， λ 需換成數字)。
- 在直方圖上加上 (紅色) 標準常態分佈曲線。



¹這是作業 (6) 第 4 題，請把 R/RStudio 畫的圖存成 myplot.pdf，並引入本 L^AT_EX 文檔。