5.1)

$\because X \sim b(1,p)$

$\therefore$样本空间为$X=(x_1,x_2,x_3,x_4,x_5),\qquad x_i=0,1$

$\therefore P(X=(x_1,x_2,x_3,x_4,x_5))=p^{\sum x_i}(1-p)^{5-\sum x_i}$

5.2)

统计量不含未知参数

$\therefore X_1+X_2$，$min\ X_i$是统计量，其他不是

5.3)

$$
\begin{aligned}
&F_n(x)\\
&=0, \qquad\qquad x<0\\
&=\frac{n-m}{n}, \quad 0\le x<1\\
&=1, \qquad\qquad x\ge 1
\end{aligned}
$$

6)

$\because \overline{x}=\dfrac{\sum x_i}{n}$

$\therefore \overline{y}=\dfrac{\sum y_i}{n}=\dfrac{\sum(ax_i+b)}{n}=a\overline{x}+b$

$\because S_x^2=\dfrac{\sum(x_i-\overline{x})^2}{n-1}$

$\therefore S_y^2=\dfrac{\sum(y_i-\overline{y})^2}{n-1}=\dfrac{\sum(ax_i-a\overline{x})^2}{n-1}=a^2S_x^2$

计算得$\overline{y}=540,\quad S_y^2=2100$

1.1)

$\because \overline{X}\sim N(20,0.9),\quad \overline{Y}\sim N(20,0.6)$

由于相互独立

$\therefore \overline{X}-\overline{Y}\sim N(0,1.5)$

$\therefore P=2(1-\phi(\frac{0.3}{\sqrt{1.5}}))$

查表即可

1.2)

$\because (n-1)S^2 \sim \sigma^2\chi^2_{n-1}$

$\therefore 9S_X^2 + 14S_Y^2 \sim 9(\chi^2_9 + \chi^2_{14}) \sim 9(\chi^2_{23})$

$\therefore P = (\chi^2_{23})^{-1}(\frac{164}{9})$

查表即可

14)

令$X_i' = X_i/\sigma_i$

则$X_i' \sim N(0,1)$

$$\therefore \xi = \sum_i (\frac{X_i}{\sigma_i} - \frac{Z}{\sigma_i})^2 = \sum_i (\frac{X_i}{\sigma_i})^2 - Z^2 \sum_i \frac{1}{\sigma_i^2}$$

$$令A = \begin{pmatrix} \frac{1}{\sigma_1}\frac{1}{\sqrt{\sum \frac{1}{\sigma_i^2}}} & \cdots & \frac{1}{\sigma_n}\frac{1}{\sqrt{\sum \frac{1}{\sigma_i^2}}} \\ a_{21} & & a_{2n} \\ \cdots & & \cdots \\ a_{n1} & & a_{nn} \end{pmatrix}$$

$Y = AX'$

$$\therefore Y_1 = \sqrt{\sum \frac{1}{\sigma_i^2}} Z, \quad Y_i \sim N(0,1),\ i \neq 1$$

$\because A$是正交矩阵

$$\therefore \xi = \sum_{i=1}^n X_i'^2 - Y_1^2 = \sum_{i=2}^n Y_i^2 \sim \chi^2_{n-1}$$