28)

因为对于正态分布，矩估计都是连续可导的

而$g(\theta)$在$\theta = 0$处不可导

所以没有无偏估计

30)

显然是无偏估计，下证UMVUE

$$\because E\delta(T) = \int_{-\infty}^{\infty} \delta(t) \frac{1}{\sqrt{2\pi}\sigma} exp\{-\frac{(t-a)^2}{2\sigma^2}\} dt = 0$$

$$\therefore \int_{-\infty}^{\infty} \delta(t) exp\{-\frac{(t-a)^2}{2\sigma^2}\} dt = 0$$

$$\therefore \int_{-\infty}^{\infty} \delta(t) exp\{-\frac{(t-a)^2}{2\sigma^2}\} * ln \frac{-(t-a)^2}{2\sigma^2} * \frac{4(t-a)^2}{\sigma^3} dt = 0$$

$$\therefore E(h(T)\delta(T)) = 0$$

31.1)

$$f(X, \sigma^2) = (\frac{1}{2\pi\sigma^2})^{\frac{n}{2}} exp\{-\frac{1}{2\sigma^2} \sum X_i^2\}$$

$\therefore S^2 = \frac{1}{n-1} \sum X_i^2$存在一一对应，是充分完全统计量

31.2)

令$\hat{\sigma}^2 = \frac{1}{n-1} \sum X_i^2$

由30题知是UMVUE

$$\therefore \hat{\sigma} = \sqrt{\frac{1}{n-1} \sum X_i^2}$$

$$\therefore 3\hat{\sigma}^4 = 3(\frac{1}{n-1} \sum X_i^2)^2$$