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[1]

(a) $Z=\frac{X-\mu}{\sigma}$, $f_Z(x)=e^{-\frac{1}{2}x^2}\cdot\frac{1}{\sqrt{2\pi}}$ 常態分布

$E(Z)=0$, $E(Z-\mu)^2=1$

$E(Z_0+Z_1)=0$; $E(Z_0+Z-\mu)^2=1+1=2$ 卡方分布

(b) $Q_1=Z^2$: $\chi^2(df=1)$ 卡方分布

(c) $Q_2=Z_1^2+Z_2^2$: $\chi^2(df=2)$

(e) 柯西分布

[2] (a) $P(Z_0+Z_1\le 1)=0.6914$, (1-st. norm. sf (1, 0.2))

(b) $P(Z_0^2\le 1)=0.8413$, (1-st. norm. sf (1, 0, 1))

(c) $P(Z_1^2+Z_2^2\le 1)=0.6914$, (1-st. norm. sf (1, 0, 2))

(d) $P(\frac{Z_0}{Z}\le 1)$

[3] (a) $\mu_A=65$

$Z=\frac{\bar{X}_A-65}{\frac{3}{5}}$

$P(\bar{X}_A\le 64)=P(\frac{\bar{X}_A-65}{\frac{3}{5}}\le\frac{64-65}{\frac{3}{5}})$

$=P(Z\le -1.67)\fallingdotseq 0.04746\fallingdotseq 4.7\%$