

[1]

(a) 常態分布 $f_n(z) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(z-\mu)^2}{2\sigma^2}}$

(b) 自由度為 1 的卡方分布

$$\frac{0.3989422804014333 e^{-0.5x}}{x^{0.5}}$$

(c) 自由度為 2 的卡方分布 $\frac{0.5 e^{-0.5x}}{1}$

(d) 柯西分布 $f(z; 0, 1) = \frac{1}{\pi(1+z^2)}$

(e) 自由度為 1 的 t 分布 $\frac{0.443113462726379\sqrt{2}}{\sqrt{\pi}(\frac{x^2}{2}+1)^{1.5}}$

[2]

(b) $V=1$
 $X_2=1$
 $\alpha_2 = \text{st. chi2, cdf}(X_2, V)$
 $\alpha_2 = 0.68269$

(c) $d = .05$
 $X = \text{st. t. ppf}(\alpha, V)$
 $X = -1.7108820799$

(c) $V=2$
 $X_2=1$
 $\alpha_3 = \text{st. chi2, cdf}(X_2, V)$
 $\alpha_3 = 0.39347$

(d) $X_2 = \text{st. t. ppf}(0.95, V)$
 $X_1 = \text{st. t. ppf}(0.05, V)$
 (X_1, X_2)
 $(-1.7108820799094282, 1.7108820799094282)$

(e) $V=1$
 $t=1$
 $\alpha_5 = \text{st. t. cdf}(t, V)$
 $\alpha_5 = 0.75$

[3]

(a) $\mu = 65$
 $\sigma = 3$
 $n = 25$
 $X_{\text{Bar}} = 64$ $\mu_X = \mu$
 $\sigma_X = \sigma/\sqrt{n}$
 $\text{prob} = \text{st. norm. cdf}(X_{\text{Bar}}, \mu_X, \sigma_X)$
 $\text{prob} = 0.477903$

(b) $\mu = 65$
 $\sigma = 3$
 $n = 25$
 $V = n-1$
 $X_{\text{Bar}} = 64$
 $t = (X_{\text{Bar}} - \mu) / (\sigma/\sqrt{n})$
 $\text{prob} = \text{st. t. cdf}(t, V)$
 $\text{prob} = 0.542900615$