資工二 鍾侑宸 B0729055

[1] (a) $z = \frac{x-\mu}{\sigma}$, $f_z(x) = e^{-\frac{1}{2}x^2} \cdot \frac{1}{\sqrt{2\pi}}$, $E(z)=0$, $E(z-\mu)^2=1$, $E(z_0+z_1)=0$;

$E(z_0+z_1-\mu)^2=1+1=2$

(b) $Q_1 = z^2 : \chi^2(df=1)$

(c) $Q_2 = z_1^2+z_2^2 : \chi^2(df=2)$

[2] (a) $P(z_0+z_1 \leq 1) = 0.6914$, (1-st.norm.sf(1, 0, 2))

(b) $P(z_0^2 \leq 1) = 0.8413$, (1-st.norm.sf(1, 0, 1))

(c) $P(z_1^2+z_2^2 \leq 1) = 0.6914$, (1-st.norm.sf(1, 0, 2))

(d) $P(\frac{z_0}{z_1} \leq 1)$

[3] (a) $\mu_A = 65$, $\frac{\sigma_A^2}{n} = \frac{3^2}{25} = \frac{9}{25}$, $z = \frac{\bar{x}_A - 65}{\frac{3}{5}}$

$$P(\bar{x}_A \leq 64) = P\left(\frac{\bar{x}_A - 65}{\frac{3}{5}} \leq \frac{64-63}{\frac{3}{5}}\right) = P(z \leq -1.67) \fallingdotseq 0.04746 = 4.7\%$$