

$$1. (a) f_z(z) = \frac{1}{\sqrt{2\pi}} e^{-\frac{z^2}{2}}$$

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$$(b) 68\%$$

$$(c) 1.96$$

$$(d) f_Q(q) = \frac{1}{\sqrt{\pi}x} e^{-\frac{x}{2}} \cdot x > 0$$

$$(e) 1$$

$$(f) \sqrt{2}$$

$$(g) P(Q \leq 1) = 0.682689$$

$$; \text{st. chi2, cdf}(1, df=1)$$

$$2. (a) f_T(t) = \begin{cases} e^{-t}, & t \geq 0 \\ 0, & t < 0 \end{cases}$$

$$(b) 1$$

$$(c) 1$$

$$(d) \frac{1}{e}$$

$$(e) f_{T_3}(t) = \frac{x^2 e^{-x}}{\Gamma(3)}, x > 0 \Rightarrow \frac{x^2 e^{-x}}{2}, x > 0$$

$$\Gamma(3) = 2! = 2$$

$$(f) 3$$

$$(g) \sqrt{3}$$

$$(h) 0.424; 1 - \text{st. gamma, cdf}(3, a=3, \text{scale}=1)$$

$$(g) P(T_3 > 7) \approx 0.03; \text{很難接受, 因為這樣情況機會太小}$$