2 a : simple hypothese ; c : composite hypothese.

b : simple   d : composite

4 (a) $\Lambda_1 = \frac{f_0(x_1)}{f_A(x_1)} = \frac{0.2}{0.1} = 2$; $\Lambda_2 = \frac{f_0(x_2)}{f_A(x_2)} = \frac{0.3}{0.4} = 0.75$; $\Lambda_3 = \frac{f_0(x_3)}{f_A(x_3)} = \frac{0.3}{0.1} = 3$

$\Lambda_4 = \frac{f_0(x_4)}{f_A(x_4)} = \frac{0.2}{0.4} = 0.5$; $\Lambda_4 < \Lambda_2 < \Lambda_1 < \Lambda_3$

(b) $\alpha = 0.2$

$P\left(\frac{f_0(x)}{f_A(x)} \le 0.5\right) = P(X = x_4) = 0.2$

$\therefore$ when $X = x_4$ we reject H_0

$\alpha = 0.5$

$P\left(\frac{f_0(x)}{f_A(x)} \le 0.75\right) = P(X = x_4 \text{ or } X = x_2) = 0.3 + 0.2 = 0.5$

$\therefore$ when $X = x_4$ or x_2 we reject H_0

.10 $\Lambda = \frac{f(x_1 \cdots x_n \mid \theta_0)}{f(x_1 \cdots x_n \mid \theta_1)} = \frac{g(T(x_1, \cdots x_n), \theta_0)\, h(x_1 \cdots x_n)}{g(T(x_1, \cdots x_n), \theta_1)\, h(x_1 \cdots x_n)}$

$= \frac{g(T(x_1 \cdots x_n), \theta_0)}{g(T(x_1 \cdots x_n), \theta_1)} = A(T)$ this is a function of T

if the distribution T is known, we can use this distribution to find reference region: $\{\Lambda < C\}$

$\alpha = P\{\Lambda < C\} = P\{A(T) < C\}$.