3.3.

(a) $\sum_z P(Z=z \mid B_1 \ldots B_n) = 1$

$\because \sum_{z=-\infty}^{+\infty} \left(\frac{1-\alpha}{1+\alpha}\right) \alpha^{|z-f(B)|}$

$\because z = -\infty$ to $+\infty$

$\therefore z + f(B)$ still from $-\infty$ to $+\infty$

$\therefore \sum_{z=-\infty+f(B)}^{+\infty+f(B)} \left(\frac{1-\alpha}{1+\alpha}\right) \alpha^{|z+f(B)-f(B)|}$

$$= \sum_{z=-\infty}^{\infty} \left(\frac{1-\alpha}{1+\alpha}\right) \alpha^{|z|} = \left(\frac{1-\alpha}{1+\alpha}\right) \sum_{z=-\infty}^{\infty} \alpha^{|z|}$$

$$= \left(\frac{1-\alpha}{1+\alpha}\right)\left(\alpha^0 + 2\sum_{z=1}^{\infty} \alpha^z\right) = \left(\frac{1-\alpha}{1+\alpha}\right)\left(1 + 2\left(\frac{\alpha}{1-\alpha}\right)\right)$$

$$= \left(\frac{1-\alpha}{1+\alpha}\right)\left(\frac{1+\alpha}{1-\alpha}\right) = 1$$

$\therefore$ the conversion is normalized when $z \in [-\infty, +\infty]$.

(b)