

let $u = \frac{x + \sqrt{E_b}}{\sqrt{N_0}}$

(P2)

$$du = \frac{1}{\sqrt{N_0}} dx$$

when $x = 0$

$$u = \frac{\sqrt{E_b}}{\sqrt{N_0}} \quad x = 0$$

$$P_{10} = \frac{1}{\sqrt{2\pi} N_0} \int_{\frac{\sqrt{E_b}}{\sqrt{N_0}}}^{\infty} \exp(-u^2) du$$

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$$\text{erf c}(u) = \frac{2}{\sqrt{\pi}} \int_u^{\infty} \exp(-u^2) du \quad \text{--- (2)}$$

from (2)

$$P_{10} = \frac{1}{2} \text{erf c}\left(\sqrt{\frac{E_b}{N_0}}\right)$$

$$P_{10} = P_{01}$$

