$\Phi(x)=\frac{2}{\sqrt{2\pi}}\int_0^x e^{-\frac{V^2}{2}}dV$ - функция Крампа, табулирована. Т.к. $\Phi(\infty)=1\Rightarrow$

$$P(\gamma_2|H_1)=0,5\left[\frac{2}{\sqrt{2\pi}}\int_0^\infty e^{-\frac{V^2}{2}}dV-\frac{2}{\sqrt{2\pi}}\int_0^{\frac{0,5E_э}{\sigma_\zeta}} e^{-\frac{V^2}{2}}dV\right]=0,5\left[\Phi(\infty)-\Phi(\frac{0,5E_э}{\sigma_\zeta})\right]=$$

$$=0,5\left[1-\Phi(\frac{0,5E_э}{\sigma_\zeta})\right].$$

Т.к. $\sigma_\zeta^2=\sigma_\eta^2E_э=\frac{N_0}{2}E_э\Rightarrow\sigma_\zeta=\sqrt{\frac{N_0E_э}{2}}\Rightarrow P(\gamma_2|H_1)=0,5\left[1-\Phi\left(\sqrt{\frac{E_э}{2N_0}}\right)\right].$

По гипотезе H_2:

$$y(t)=S_2(t)+\eta(t)\Rightarrow\int_0^T(S_2(t)+\eta(t))[S_1(t)-S_2(t)]dt-0,5(E_1-E_2)=$$

$$=\int_0^T S_2(t)[S_1(t)-S_2(t)]dt+\int_0^T\eta(t)[S_1(t)-S_2(t)]dt-0,5(E_1-E_2)=$$

$$\int_0^T\eta(t)[S_1(t)-S_2(t)]dt-0.5\int_0^T[S_1(t)-S_2(t)]^2dt=\xi-0,5E_э\Rightarrow$$

$$P(\gamma_1|H_2)=P\{\zeta>0,5E_э|H_2\}==\int_{0,5E_э}^\infty\frac{1}{\sqrt{2\pi}\sigma_\zeta}e^{-\frac{x^2}{2\sigma_\zeta^2}}dx=\frac{1}{\sqrt{2\pi}}\int_{\frac{0,5E_э}{\sigma_\zeta}}^\infty e^{-\frac{V^2}{2}}dV=$$

$$=0,5\left[\frac{2}{\sqrt{2\pi}}\int_0^\infty e^{-\frac{V^2}{2}}dV-\frac{2}{\sqrt{2\pi}}\int_0^{\frac{0,5E_э}{\sigma_\zeta}}e^{-\frac{V^2}{2}}dV\right]=0,5\left[\Phi(\infty)-\Phi(\frac{0,5E_э}{\sigma_\zeta})\right]=$$

$$=0,5\left[1-\Phi\left(\sqrt{\frac{E_э}{2N_0}}\right)\right],$$

(была произведена замена переменной $V=\frac{x}{\sigma_\xi}\Rightarrow dV=\frac{dx}{\sigma_\xi}$).

Т.е. $P(\gamma_1|H_2)=P(\gamma_2|H_1)\Rightarrow P_{ош}=0,5\cdot 2P(\gamma_2|H_1)=0,5\left[1-\Phi\left(\sqrt{\frac{E_э}{2N_0}}\right)\right].$