1. $$R = \frac{1}{\tau_{cp}} H_{\max}(X) = \frac{\log_2 2}{(\tau_0 + \tau_1)/2} = \frac{1}{3} \approx 0{,}33 \left[\frac{біт}{c}\right];$$

2. $$R = \frac{1}{\sum\limits_{i=1}^{n} \tau_{c\,i}\, p(x_i)} \left[-\sum_{i=0}^{1} p(x_i) \log_2 p(x_i)\right] = \frac{(0{,}37 \times \log_2 0{,}37 + 0{,}63 \times \log_2 0{,}63)}{0{,}63 \times 5 + 0{,}37 \times 1} = 0{,}27;$$

3. $$Q^* = \frac{H(X)}{l_{cp(m_2)}},$$

4. $$R^n = V[H(X) \quad H(X/Y)] = V[H(Y) \quad H(Y/X)] =$$
$$= V[H(X) + H(Y) \quad H(X\,Y)].$$

5. $$P(Y/X) = \begin{Vmatrix} 1 & 0 & 0 \\ 0{,}25 & 0{,}75 & 0 \\ 0 & 0{,}2 & 0{,}8 \end{Vmatrix}$$

6. $$p_{np} = \left\{1 - 2^{n\tau[R - H(X)]} \quad \right\} 2^{n\tau H(X/Y)}$$

7. $$R = \frac{1}{\sum\limits_{i=1}^{n} \tau_{c\,i}\, p(x_i)} \left[-\sum_{i=0}^{1} p(x_i) \log_2 p(x_i)\right]$$

8. $$H(\xi) \le p(\varepsilon) \log_a (m-1),$$

9. $$H(X/Y) \le -p(\varepsilon) \log_a p(\varepsilon) - \{[1 - p(\varepsilon)] \log_a [1 - p(\varepsilon)]\} +$$
$$+ p(\varepsilon) \log_a (m-1).$$

10. $$C^n = F_o \max_{w(x)} [H_\partial(x) - H_\partial(x/y)] =$$
$$= F_o \max_{w(x)} [H_\partial(y) - H_\partial(y/x)].$$

11. $$H_\partial(y/x) = -\int_{-\infty}^{+\infty}\int_{-\infty}^{+\infty} w(y) w(x/y) \log_a w(x/y) \partial x \partial y =$$
$$= -\int_{-\infty}^{+\infty} w(y) \left[\int_{-\infty}^{+\infty} w(x/y) \log_a w(x/y) \partial x\right] \partial y =$$
$$= \int_{-\infty}^{+\infty} w(y) \partial y\, H_\partial(n) = H_\partial(n),$$

12. $$H_\partial(n) = \log_a(\sqrt{2\pi}\, \sigma_n) + \log_a \sqrt{e} = \log_a(\sqrt{2\pi e \sigma_n^2}).$$

13. $$C^n = 2\Delta F_к \left[\log_a \left[\sqrt{2\pi e(\sigma_x^2 + \sigma_n^2)} \right] - \log_a (\sqrt{2\pi e \sigma_n^2}) \right] =$$

$$= 2\Delta F_к \log_a \sqrt{\frac{\sigma_x^2 + \sigma_n^2}{\sigma_n^2}} = \Delta F_к \log_a \left(1 + \frac{P_c}{P_n} \right).$$

14. $$\lim_{\Delta F_K \to \infty} C^n = \lim_{\Delta F_K \to \infty} \left\{ \frac{\log_a \left(1 + \frac{P_c}{N_o \Delta F_к} \right)}{\frac{1}{\Delta F_к}} \right\}.$$

15. $$\frac{C^n}{\Delta F_0} = \frac{\Delta F_к}{\Delta F_o} \log_a \left(1 + \frac{P_c}{N_o \Delta F_к} \right) = \frac{\Delta F_к}{\Delta F_o} \log_a \left(1 + \frac{\Delta F_o}{\Delta F_к} \right)$$

16. $$C^n = \int_{f_1}^{f_2} \Delta F \log_a \left[1 + \frac{P_c(f)}{P_n(f)} \right] \partial f.$$

17. $$C^n \approx \Delta F_к \int_{-\infty}^{+\infty} \frac{2\mu}{\mu_o^2} \exp\left(-\frac{\mu^2}{\mu_o^2} \right) \ln\left(1 + \frac{\mu^2 P_c}{\mu_o^2 P_n} \right) \partial\mu \approx$$

$$\approx -\Delta F_к \exp\left(\frac{P_n}{P_c} \right) E\left(-\frac{P_n}{P_c} \right),$$

18. $$\Delta F_к = \frac{C^n}{\log_2 \left(1 + \frac{P_c}{P_n} \right)} \approx \frac{4{,}185 \cdot 10^7}{9{,}97} \approx 4{,}2\ [МГц].$$

19. $$R = \frac{1}{\sum_{i=1}^{n} \tau_{ci}\, p(x_i)} \left[-\sum_{i=0}^{1} p(x_i) \log_2 p(x_i) \right]$$

20. $$V = \frac{1}{\tau_c} = \frac{1}{0{,}02} = 50\,[бод],$$

21. $$C = \lim_{m \to \infty} \frac{-m \sum_{i=1}^{n} p(x_i) \log_a p(x_i)}{m \sum_{i=1}^{n} p(x_i) \tau_{ci}} = \frac{m}{m\tau_c} \log_a n = \frac{1}{\tau_c} \log_a n = V \log_a n.$$

22. $$R = \frac{1}{\tau_c} \log_2 n = \frac{\log_2 2^5}{0{,}15} = \frac{5}{0{,}15} \approx 33{,}3\ [бод].$$