

$$\mu_{A_i} = \frac{1}{1 + e^{b_i(a_i - a)}} = \frac{1}{1 + e^{b_i(a_i - a)}} = \beta_i \quad \beta_i = \frac{1}{1 + e^{b_i(a_i - a)}}$$

$$w_i = \beta_i \cdot \beta_i$$

$$0 = \frac{\sum w_i \cdot \beta_i}{\sum w_i}$$

$$E = \frac{1}{2} \cdot (t_s - o_s)^2$$

i. prokla
s. primjer

$$f_i = p_i \cdot g_i \cdot y + t_i$$

$$\frac{\partial E}{\partial p_k} = \frac{\partial E}{\partial o_s} \cdot \frac{\partial o_s}{\partial f_k} \cdot \frac{\partial f_k}{\partial p_k}$$

$$\frac{\partial E}{\partial o_s} = -(t_s - o_s)$$

$$\frac{\partial o_s}{\partial f_k} = \frac{w_k}{\sum w_i}$$

$$\frac{\partial E}{\partial g_k} = \frac{\partial E}{\partial o_s} \cdot \frac{\partial o_s}{\partial f_k} \cdot \frac{\partial f_k}{\partial g_k}$$

$$\frac{\partial f_k}{\partial p_k} = x \quad \frac{\partial f_k}{\partial g_k} = y \quad \frac{\partial f_k}{\partial t_k} = 1$$

$$\frac{\partial E}{\partial t_k} = \frac{\partial E}{\partial o_s} \cdot \frac{\partial o_s}{\partial f_k} \cdot \frac{\partial f_k}{\partial t_k}$$

$$\frac{\partial E}{\partial t_k} = -(t_s - o_s) \cdot \frac{w_k}{\sum w_i}$$

$$\frac{\partial E}{\partial p_k} = -(t_s - o_s) \cdot \frac{w_k}{\sum w_i} \cdot x \quad \frac{\partial E}{\partial g_k} = -(t_s - o_s) \cdot \frac{w_k}{\sum w_i} \cdot y$$

$$\frac{\partial E}{\partial a_k} = \frac{\partial E}{\partial o_s} \cdot \frac{\partial o_s}{\partial w_k} \cdot \frac{\partial w_k}{\partial a_k} \cdot \frac{\partial a_k}{\partial a_k}$$

$$\frac{\partial E}{\partial o_s} = -(t_s - o_s) \quad \frac{\partial o_s}{\partial w_k} = \frac{(\sum w_i) \cdot f_k - \sum w_i \cdot p_i}{(\sum w_i)^2}$$

$$\frac{\partial E}{\partial b_k} = \frac{\partial E}{\partial o_s} \cdot \frac{\partial o_s}{\partial w_k} \cdot \frac{\partial w_k}{\partial b_k} \cdot \frac{\partial b_k}{\partial b_k}$$

$$\frac{\partial w_k}{\partial b_k} = \beta_k \cdot \frac{\partial w_k}{\partial \beta_k} \cdot \frac{\partial \beta_k}{\partial b_k} = \frac{\sum w_i \cdot (f_k - p_i)}{(\sum w_i)^2}$$

$$\frac{\partial E}{\partial a_k} = \frac{\partial E}{\partial o_s} \cdot \frac{\partial o_s}{\partial w_k} \cdot \frac{\partial w_k}{\partial \beta_k} \cdot \frac{\partial \beta_k}{\partial a_k}$$

$$\frac{\partial \beta_k}{\partial a_k} = \beta_k \cdot (1 - \beta_k) \cdot b_k \quad \frac{\partial \beta_k}{\partial b_k} = \beta_k \cdot (1 - \beta_k) \cdot (a_k - x)$$

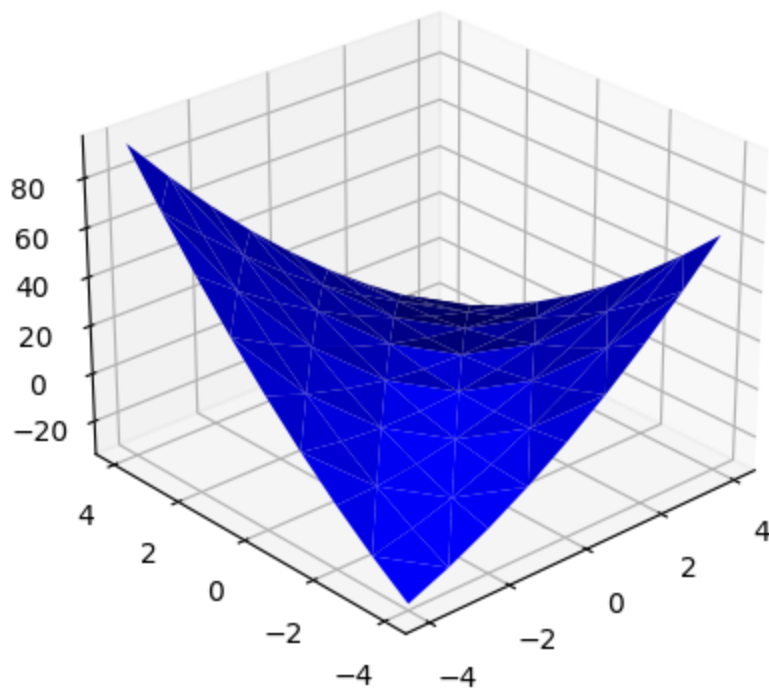
$$\frac{\partial E}{\partial b_k} = \frac{\partial E}{\partial o_s} \cdot \frac{\partial o_s}{\partial w_k} \cdot \frac{\partial w_k}{\partial \beta_k} \cdot \frac{\partial \beta_k}{\partial b_k}$$

$$\frac{\partial \beta_k}{\partial a_k} = \beta_k \cdot (1 - \beta_k) \cdot b_k \quad \frac{\partial \beta_k}{\partial b_k} = \beta_k \cdot (1 - \beta_k) \cdot (a_k - x)$$

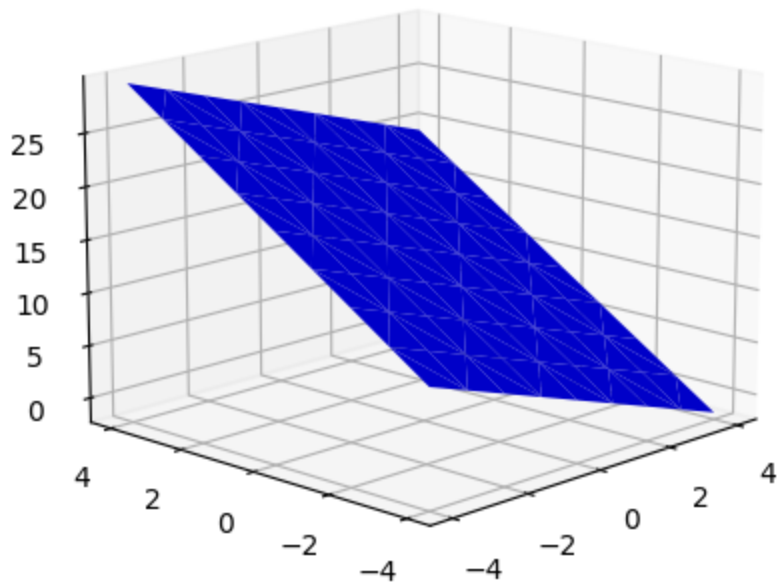
$$\frac{\partial E}{\partial a_k} = -(t_s - o_s) \cdot \frac{\sum w_i \cdot (f_k - p_i)}{(\sum w_i)^2} \cdot \beta_k \cdot \frac{\partial \beta_k}{\partial a_k} \cdot \frac{\partial a_k}{\partial a_k}$$

$$\frac{\partial E}{\partial b_k} = -(t_s - o_s) \cdot \frac{\sum w_i \cdot (f_k - p_i)}{(\sum w_i)^2} \cdot \beta_k \cdot \frac{\partial \beta_k}{\partial b_k} \cdot \frac{\partial b_k}{\partial b_k}$$

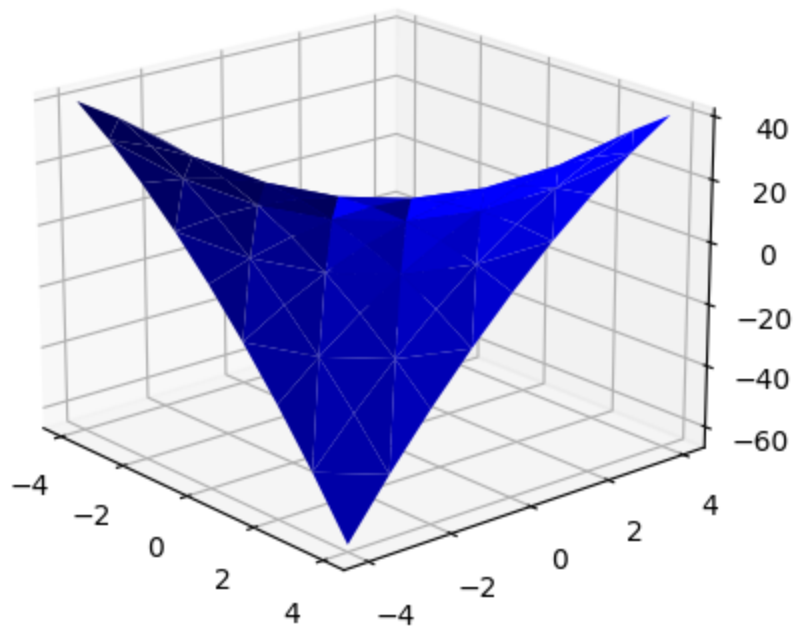
ZAD3-Graf funkcije



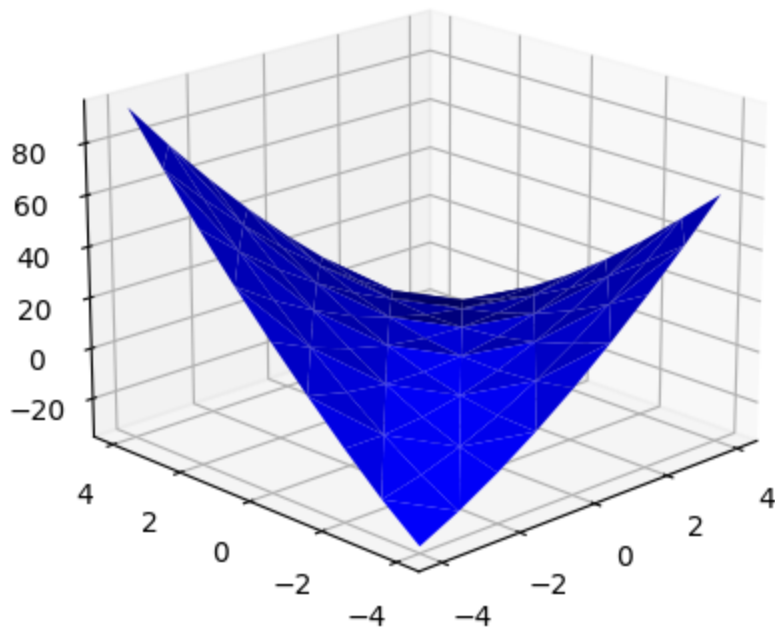
ZAD4-aproksimacija s 1 pravilom



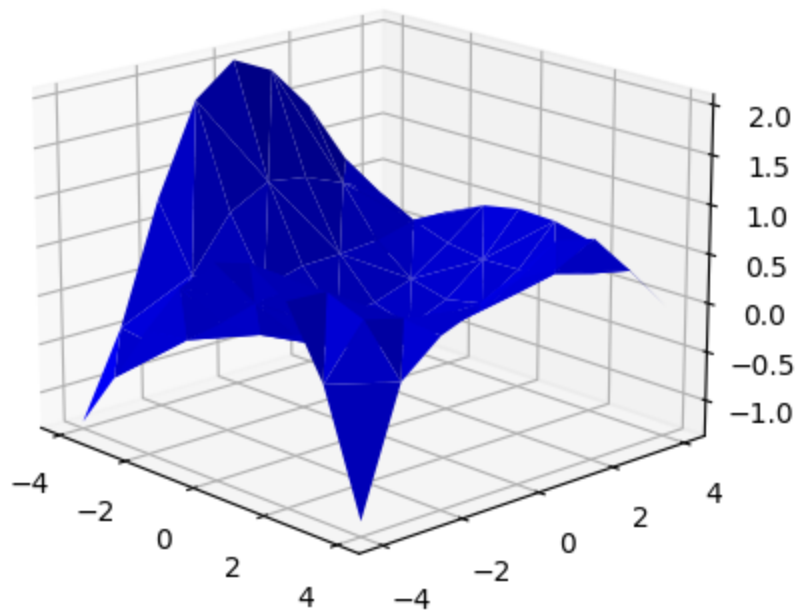
ZAD4 - greška s 1 pravilom



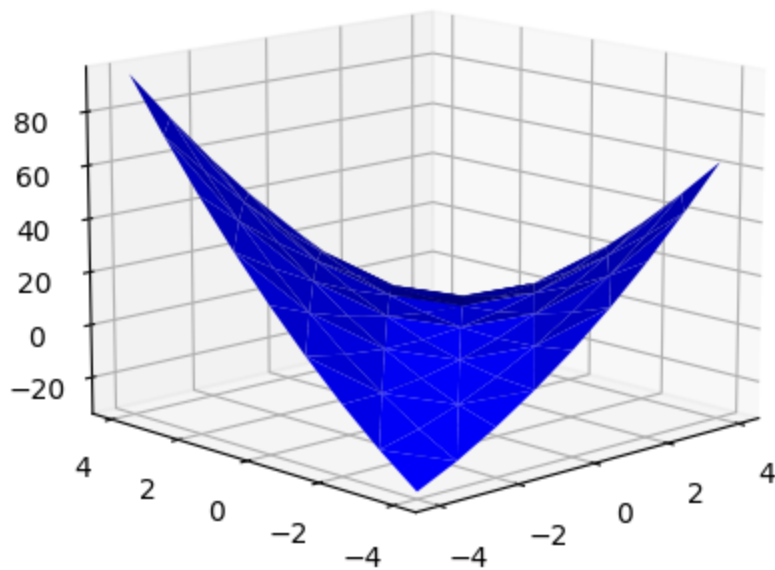
ZAD4 - aproksimacija s 2 pravila



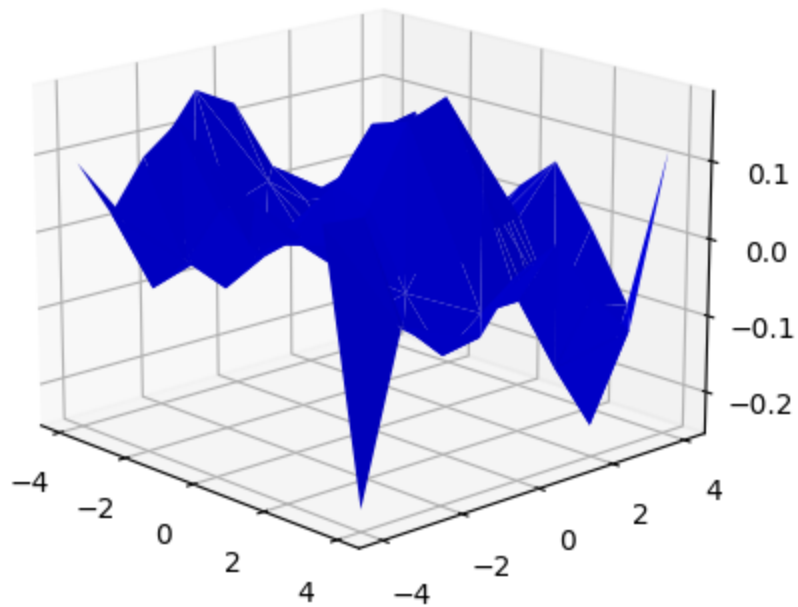
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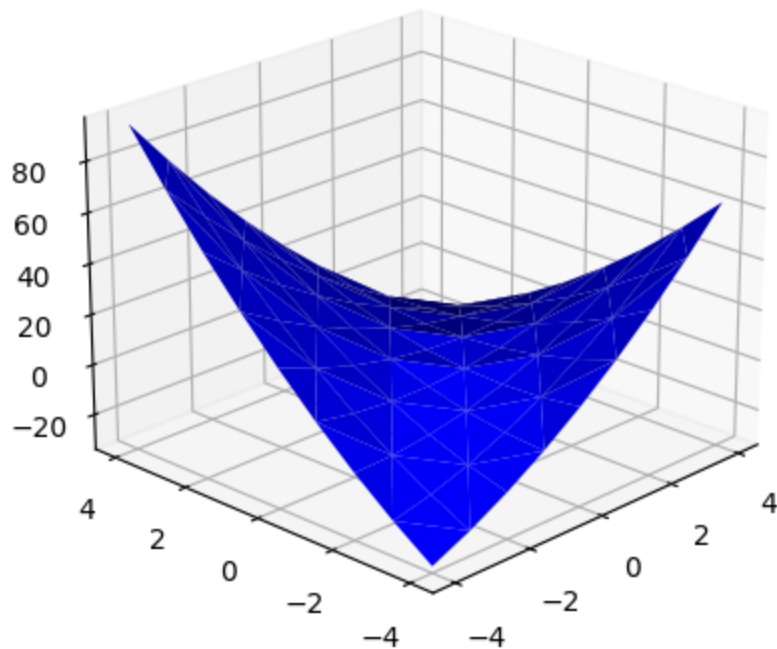
ZAD4 - aproksimacija s 4 pravila



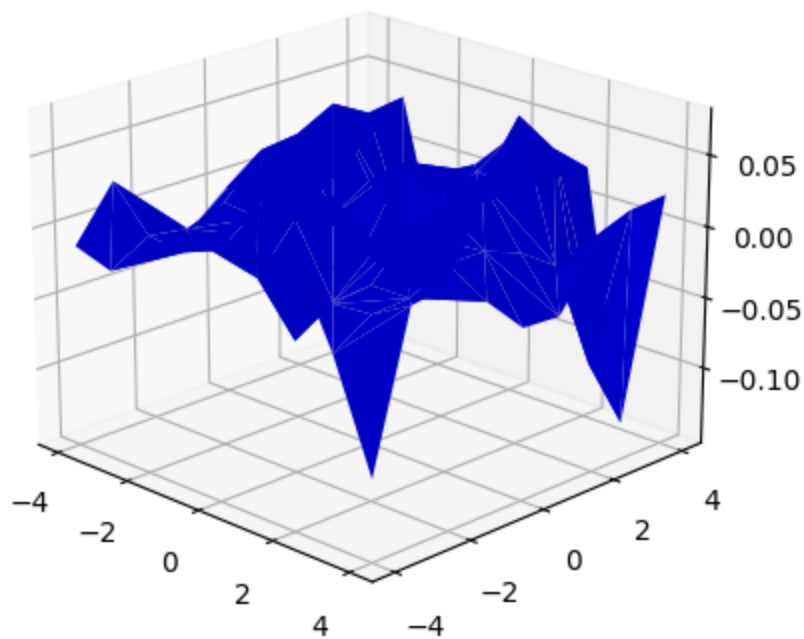
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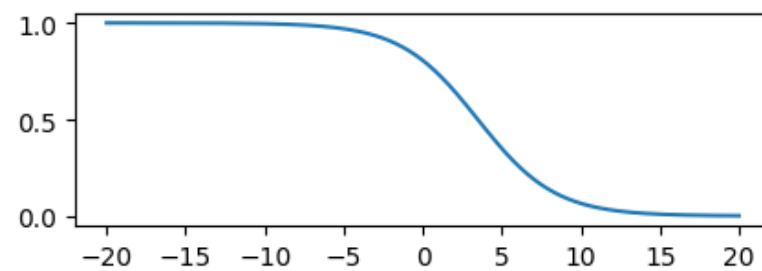
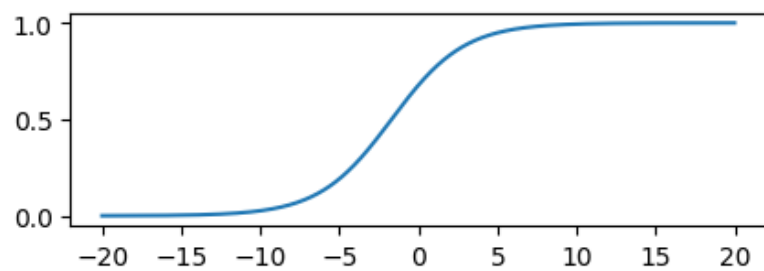
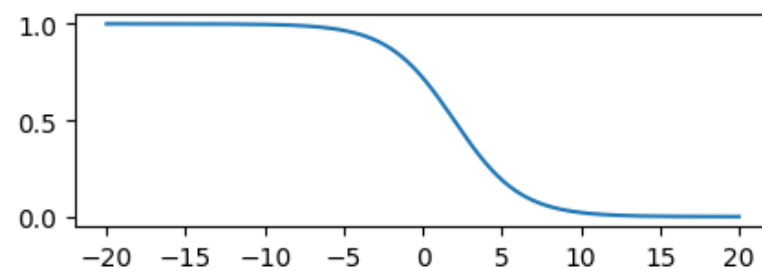
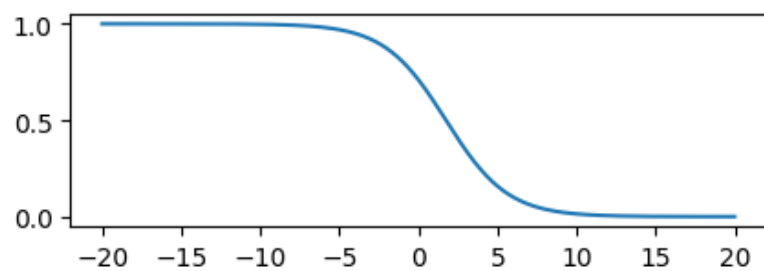
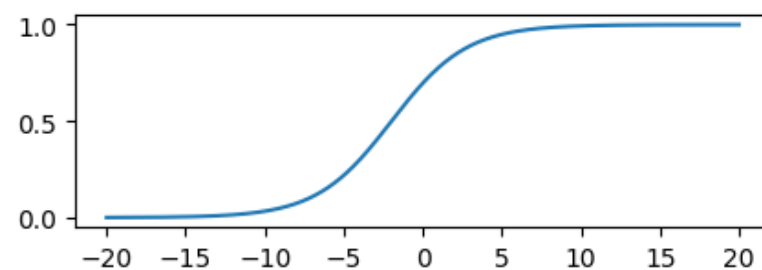
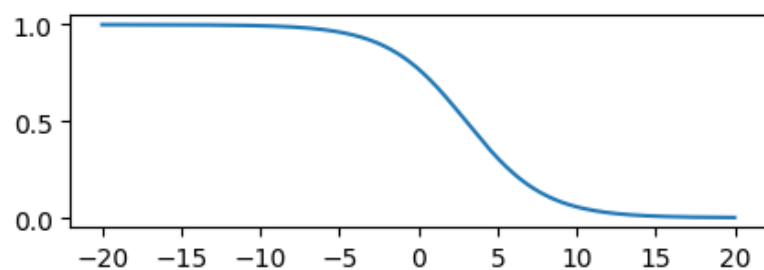
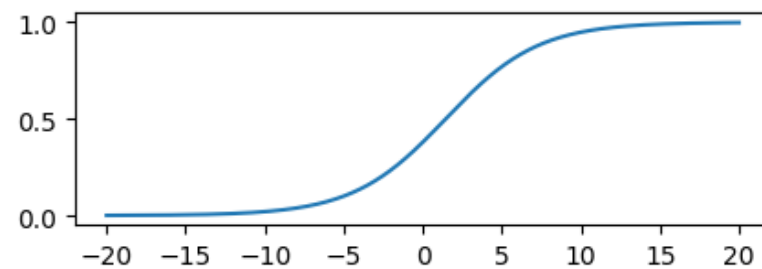
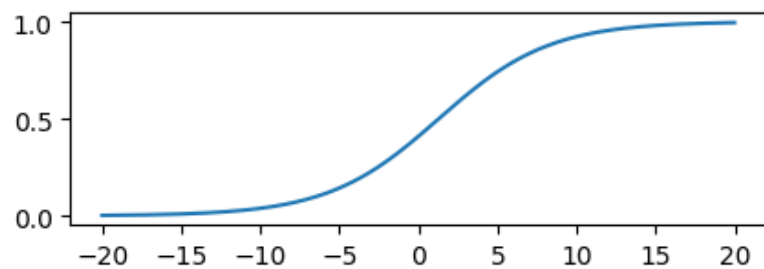
ZAD4 - aproksimacija s 8 pravila



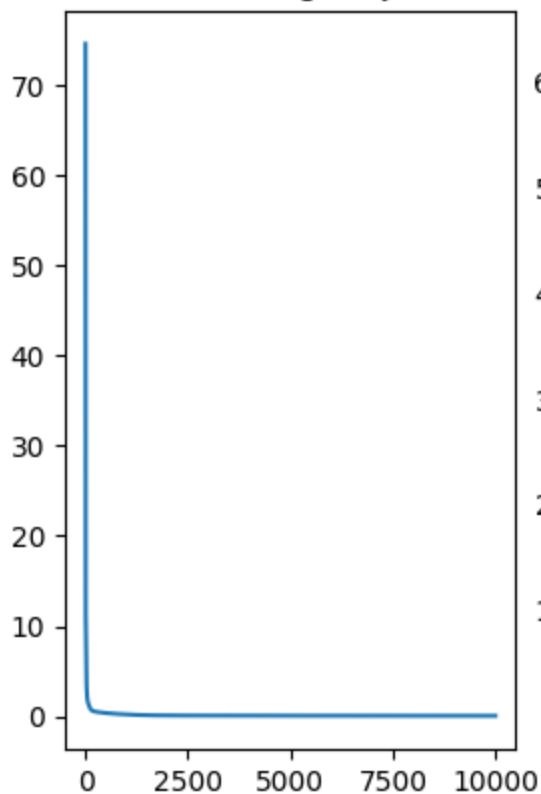
ZAD4 - greška s 8 pravila



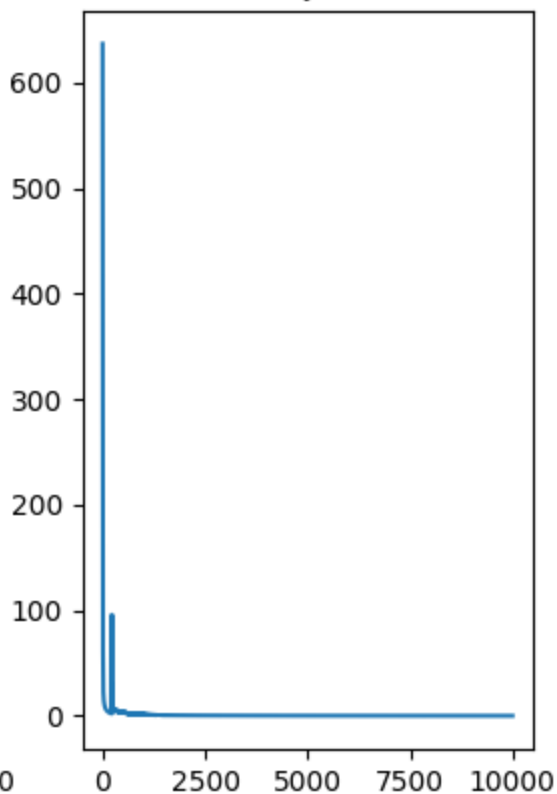
ZAD5 - funkcije pripadnosti



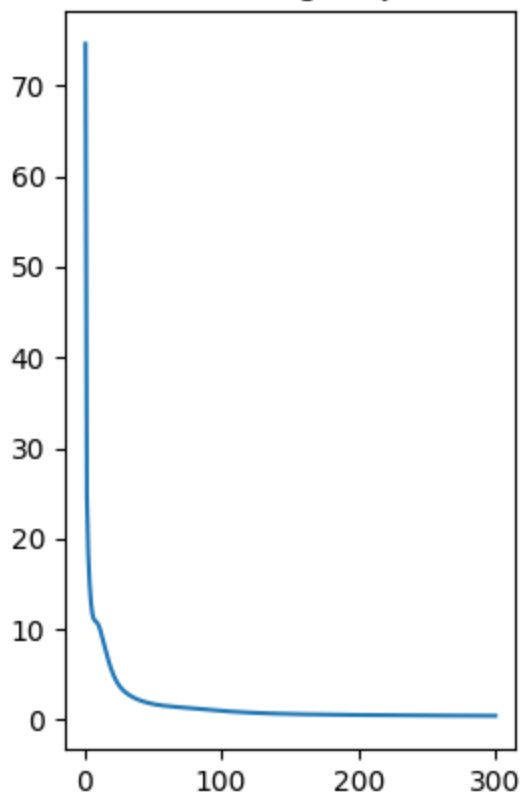
Stohastički gradijentni



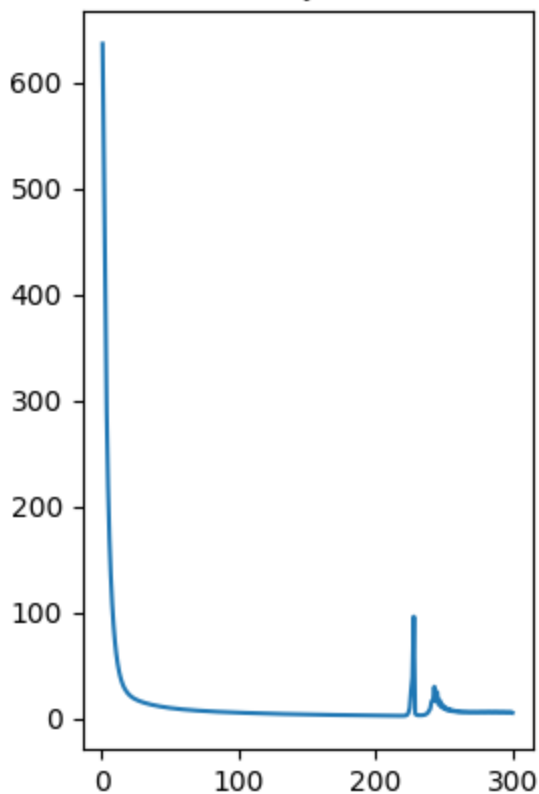
Gradijentni

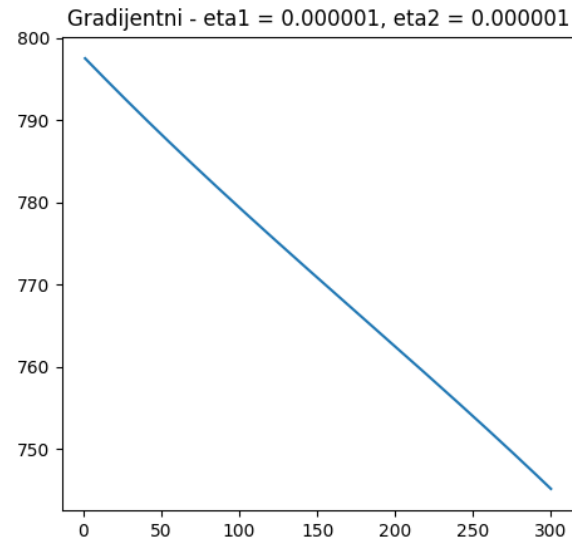
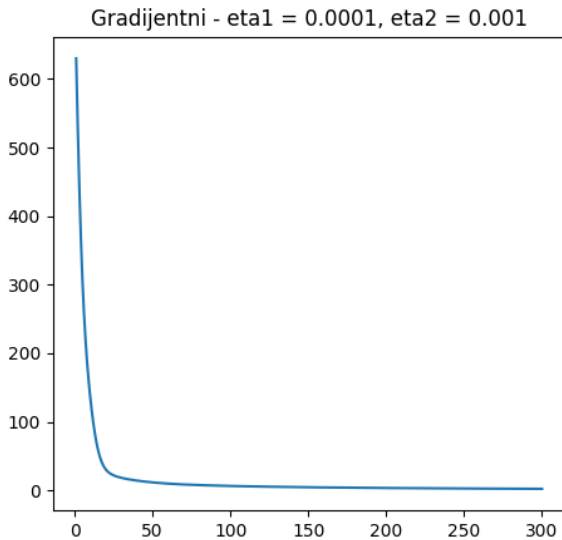
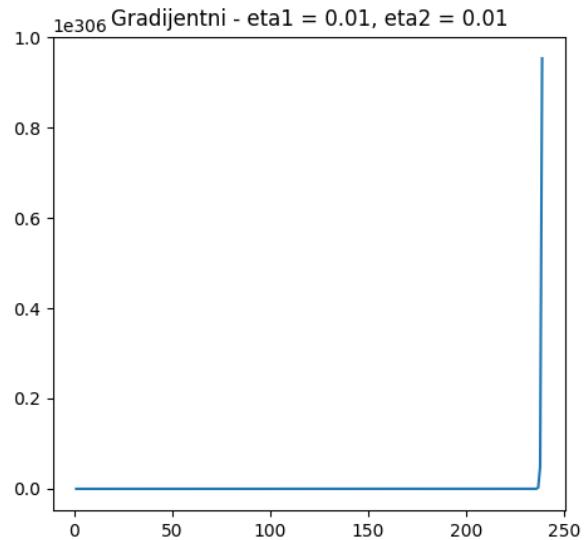


Stohastički gradijentni

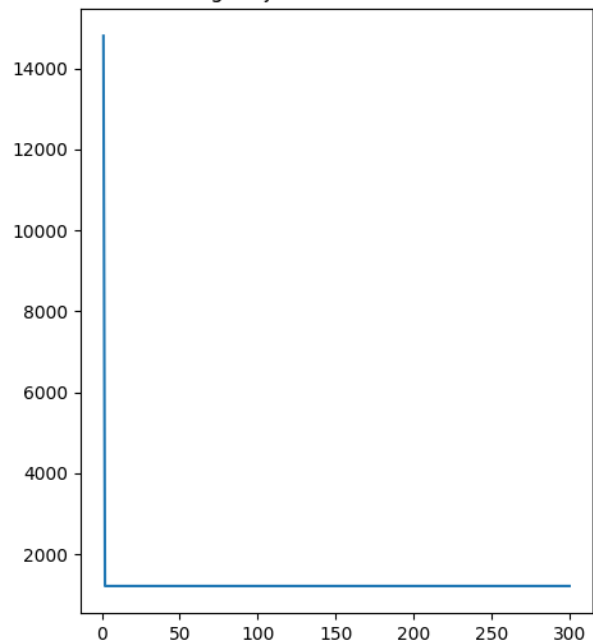


Gradijentni

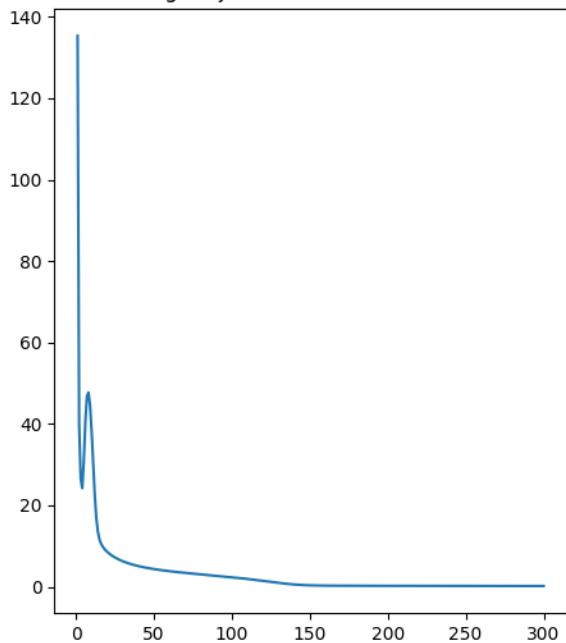




Stohastički gradijentni - eta1 = 0.1, eta2 = 0.1



Stohastički gradijentni - eta1 = 0.001, eta2 = 0.01



Stohastički gradijentni - eta1 = 0.000001, eta2 = 0.000001

