Q4) Error function

$$E(w) = -\sum_{n=1}^{N} \sum_{k=1}^{K} t_{nk} \ln y_k (x_n, w)$$

$$\frac{\partial E}{\partial a_k} = y_k - t_k, \text{ where } t_n \in \{0,1\}$$

and now o/p is given by $y_k(x_n, w) = P\left(\frac{t_k = 1}{x}\right)$

$$= \frac{\exp(a_k(x,w))}{\sum \exp(a_k(x,w))}$$

where $0 \leq y_k \leq 1$ and $\sum_k y_k = 1$

$$\frac{\partial E}{\partial a_k} = \frac{\partial}{\partial a_k} \cdot \frac{\exp(a_k(x,w))}{\sum \exp a_{k+1}(x,w)}$$

Now comparing, $\frac{\partial E}{\partial a_k} = \frac{\partial v}{\partial u}$

$$\frac{\partial v}{\partial u} = \frac{\partial}{\partial u} \int_E x^2 \, d\mu$$

$$= \frac{x^3}{3} + \phi_E + \varepsilon_\mu$$

~~then~~ where ϕ_E is Riemann constant wrt μ ~~measu~~ measurable set E

$$\phi_\varepsilon = \iint \frac{\partial}{\partial \varepsilon} x(x) + \iint \frac{\partial}{\partial u} \partial x(x) \quad (1)$$

$$\varepsilon_x = \frac{\partial^2}{\partial u^2} y(y) = \frac{\partial^2}{\partial \varepsilon^2} x(x) + y \quad (2)$$

By solving (1) & (2) we get the ~~the~~ value of ϕ_ε &

ε_v and putting value in eq^n

$$\phi_\varepsilon + \varepsilon_v = \left\{ \iint \frac{\partial'}{\partial \varepsilon} x(x) + \iint \frac{\partial}{\partial v} dx(x) \right\} + \frac{\partial^2}{\partial u^1} + y(y) + \frac{d}{\partial \varepsilon^2} x(x) + \cancel{\gamma} \}$$

$$\frac{\partial \varepsilon}{\partial a_n} = y_i - t_x$$. Hence, proved.

gamma
remain constant