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LAMPIRAN

Lampiran 1. Data Klaim Rumah Sakit Universitas Hasanuddin ke BPJS Kesehatan

No.	STATUS KLAIM	UMUR	KLAIM	LOS
1	0	48	14648200	4
2	0	71	4970100	2
3	0	13	7519800	3
4	0	31	8773300	2
5	0	53	2177700	1
6	0	38	11060700	4
7	0	0	5090400	14
8	0	20	4026100	3
9	0	61	2177700	1
10	0	14	5547900	2
⋮	⋮	⋮	⋮	⋮
362	1	60	10004300	2

Lampiran 2. Penjabaran persamaan Fungsi Lokal *Likelihood* yang Dimaksimumkan

$$\ell(\beta) = \ln L$$

$$= \ln\left[\prod_{i=1}^{362}\left(\left(\frac{\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)^{y_i}\left(\frac{1}{1+\exp(\mathbf{x\beta})}\right)^{1-y_i}\right)^{\prod_{j=1}^{3}\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)}\right]$$

$$= \sum_{i=1}^{362}\ln\left[\left(\left(\frac{\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)^{y_i}\left(\frac{1}{1+\exp(\mathbf{x\beta})}\right)^{1-y_i}\right)^{\prod_{j=1}^{3}\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)}\right]$$

$$= \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\ln\left(\left(\frac{\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)^{y_i}\left(\frac{1}{1+\exp(\mathbf{x\beta})}\right)^{1-y_i}\right)\right]$$

$$= \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(\ln\left(\frac{\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)^{y_i}+\ln\left(\frac{1}{1+\exp(\mathbf{x\beta})}\right)^{1-y_i}\right)\right]$$

$$= \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(y_i\ln\left(\frac{\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)+(1-y_i)\ln\left(\frac{1}{1+\exp(\mathbf{x\beta})}\right)\right)\right]$$

$$= \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(y_i\ln\left(\frac{\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)+\ln\left(\frac{1}{1+\exp(\mathbf{x\beta})}\right)-y_i\ln\left(\frac{1}{1+\exp(\mathbf{x\beta})}\right)\right)\right]$$

$$= \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(\ln\left(\frac{1}{1+\exp(\mathbf{x\beta})}\right)+y_i\ln\frac{\left(\frac{\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)}{\left(\frac{1}{1+\exp(\mathbf{x\beta})}\right)}\right)\right]$$

$$= \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(\ln\left(\frac{1}{1+\exp(\mathbf{x\beta})}\right)+y_i\ln(\exp(\mathbf{x\beta}))\right)\right]$$

$$= \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(\ln(1)-\ln(1+\exp(\mathbf{x\beta}))+y_i(\mathbf{x\beta})\right)\right]$$

$$= \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(0-\ln(1+\exp(\mathbf{x\beta}))+y_i(\mathbf{x\beta})\right)\right]$$

$$= \sum_{i=1}^{362} \left[\prod_{j=1}^{3} \left(\frac{1}{h_j} K \left(\frac{x_{ij} - x_{0j}}{h_j} \right) \right) \left(-\ln\left(1 + \exp\left(\mathbf{x\beta}\right)\right) + y_i \left(\mathbf{x\beta}\right) \right) \right]$$

$$= \sum_{i=1}^{362} \left[\prod_{j=1}^{3} \left(\frac{1}{h_j} K \left(\frac{x_{ij} - x_{0j}}{h_j} \right) \right) \left(y_i \left(\mathbf{x\beta}\right) - \ln\left(1 + \exp\left(\mathbf{x\beta}\right)\right) \right) \right]$$

Lampiran 3. Penjabaran Turunan Pertama dari Fungsi Lokal *Log-Likelihood* Terhadap Masing-Masing Parameter $\boldsymbol{\beta}$

a. Turunan pertama terhadap β_0

$$\frac{\partial \ell}{\partial \beta_0} = \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(y_i(\mathbf{x}\boldsymbol{\beta})-\ln\left(1+\exp(\mathbf{x}\boldsymbol{\beta})\right)\right)\right]$$

$$= \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(y_i-\frac{\exp(\mathbf{x}\boldsymbol{\beta})}{1+\exp(\mathbf{x}\boldsymbol{\beta})}\right)\right]$$

$$= \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(y_i-\pi(x_i)\right)\right]$$

e. Turunan pertama terhadap β_1

$$\frac{\partial \ell}{\partial \beta_1} = \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(y_i(\mathbf{x}\boldsymbol{\beta})-\ln\left(1+\exp(\mathbf{x}\boldsymbol{\beta})\right)\right)\right]$$

$$= \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(y_i(x_{i1}-x_{01})-\frac{(x_{i1}-x_{01})\exp(\mathbf{x}\boldsymbol{\beta})}{1+\exp(\mathbf{x}\boldsymbol{\beta})}\right)\right]$$

$$= \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(y_i(x_{i1}-x_{01})-(x_{i1}-x_{01})\pi(x_i)\right)\right]$$

f. Turunan pertama terhadap β_2

$$\frac{\partial \ell}{\partial \beta_2} = \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(y_i(\mathbf{x}\boldsymbol{\beta})-\ln\left(1+\exp(\mathbf{x}\boldsymbol{\beta})\right)\right)\right]$$

$$= \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(y_i(x_{i2}-x_{02})-\frac{(x_{i2}-x_{02})\exp(\mathbf{x}\boldsymbol{\beta})}{1+\exp(\mathbf{x}\boldsymbol{\beta})}\right)\right]$$

$$= \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(y_i(x_{i2}-x_{02})-(x_{i2}-x_{02})\pi(x_i)\right)\right]$$

g. Turunan pertama terhadap β_3

$$\frac{\partial \ell}{\partial \beta_3} = \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(y_i(\mathbf{x}\boldsymbol{\beta})-\ln\left(1+\exp(\mathbf{x}\boldsymbol{\beta})\right)\right)\right]$$

$$= \sum_{i=1}^{362} \left[\prod_{j=1}^{3} \left(\frac{1}{h_j} K \left(\frac{x_{ij} - x_{0j}}{h_j} \right) \right) \left(y_i \left(x_{i3} - x_{03} \right) - \frac{\left(x_{i3} - x_{03} \right) \exp\left(\mathbf{x}\boldsymbol{\beta} \right)}{1 + \exp\left(\mathbf{x}\boldsymbol{\beta} \right)} \right) \right]$$

$$= \sum_{i=1}^{362} \left[\prod_{j=1}^{3} \left(\frac{1}{h_j} K \left(\frac{x_{ij} - x_{0j}}{h_j} \right) \right) \left(y_i \left(x_{i3} - x_{03} \right) - \left(x_{i3} - x_{03} \right) \pi \left(x_i \right) \right) \right]$$

Lampiran 4. Penjabaran Turunan Kedua dari Fungsi ℓ Terhadap Masing-Masing Parameter $\boldsymbol{\beta}$

a. Turunan kedua $\frac{\partial \ell}{\partial \beta_0}$ terhadap $\beta_0, \beta_1, \beta_2, \beta_3$

$$\frac{\partial(\partial \ell)}{\partial \beta_0 \partial \beta_0} = \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(y_i-\frac{\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)\right]$$

$$= \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(-\frac{\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\left(1-\frac{\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)\right)\right]$$

$$= \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(-\pi(x_i)(1-\pi(x_i))\right)\right]$$

$$\frac{\partial(\partial \ell)}{\partial \beta_0 \partial \beta_1} = \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(y_i-\frac{\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)\right]$$

$$= \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(-\frac{(x_{i1}-x_{01})\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\left(1-\frac{\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)\right)\right]$$

$$= \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(-(x_{i1}-x_{01})\pi(x_i)(1-\pi(x_i))\right)\right]$$

$$\frac{\partial(\partial \ell)}{\partial \beta_0 \partial \beta_2} = \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(y_i-\frac{\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)\right]$$

$$= \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(-\frac{(x_{i2}-x_{02})\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\left(1-\frac{\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)\right)\right]$$

$$= \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(-(x_{i2}-x_{02})\pi(x_i)(1-\pi(x_i))\right)\right]$$

$$\frac{\partial(\partial \ell)}{\partial \beta_0 \partial \beta_3} = \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(y_i-\frac{\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)\right]$$

$$= \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(-\frac{(x_{i3}-x_{03})\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\left(1-\frac{\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)\right)\right]$$

$$= \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(-\left(x_{i3}-x_{03}\right)\pi\left(x_i\right)\left(1-\pi\left(x_i\right)\right)\right)\right]$$

b. Turunan kedua $\frac{\partial \ell}{\partial \beta_1}$ terhadap $\beta_0, \beta_1, \beta_2, \beta_3$

$$\frac{\partial(\partial\ell)}{\partial\beta_1\partial\beta_0} = \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(y_i\left(x_{i1}-x_{01}\right)-\frac{\left(x_{i1}-x_{01}\right)\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)\right]$$

$$= \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(-\frac{\left(x_{i1}-x_{01}\right)\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\left(1-\frac{\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)\right)\right]$$

$$= \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(-\left(x_{i1}-x_{01}\right)\pi\left(x_i\right)\left(1-\pi\left(x_i\right)\right)\right)\right]$$

$$\frac{\partial(\partial\ell)}{\partial\beta_1\partial\beta_1} = \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(y_i\left(x_{i1}-x_{01}\right)-\frac{\left(x_{i1}-x_{01}\right)\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)\right]$$

$$= \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(-\frac{\left(x_{i1}-x_{01}\right)\left(x_{i1}-x_{01}\right)\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\left(1-\frac{\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)\right)\right]$$

$$= \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(-\left(x_{i1}-x_{01}\right)\left(x_{i1}-x_{01}\right)\pi\left(x_i\right)\left(1-\pi\left(x_i\right)\right)\right)\right]$$

$$\frac{\partial(\partial\ell)}{\partial\beta_1\partial\beta_2} = \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(y_i\left(x_{i1}-x_{01}\right)-\frac{\left(x_{i1}-x_{01}\right)\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)\right]$$

$$= \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(-\frac{\left(x_{i1}-x_{01}\right)\left(x_{i2}-x_{02}\right)\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\left(1-\frac{\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)\right)\right]$$

$$= \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(-\left(x_{i1}-x_{01}\right)\left(x_{i2}-x_{02}\right)\pi\left(x_i\right)\left(1-\pi\left(x_i\right)\right)\right)\right]$$

$$\frac{\partial(\partial\ell)}{\partial\beta_1\partial\beta_3} = \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(y_i\left(x_{i1}-x_{01}\right)-\frac{\left(x_{i1}-x_{01}\right)\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)\right]$$

$$= \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(-\frac{\left(x_{i1}-x_{01}\right)\left(x_{i3}-x_{03}\right)\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\left(1-\frac{\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)\right)\right]$$

$$= \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(-\left(x_{i1}-x_{01}\right)\left(x_{i3}-x_{03}\right)\pi\left(x_i\right)\left(1-\pi\left(x_i\right)\right)\right)\right]$$

c. Turunan kedua $\frac{\partial \ell}{\partial \beta_2}$ terhadap $\beta_0, \beta_1, \beta_2, \beta_3$

$$\frac{\partial(\partial\ell)}{\partial\beta_2\partial\beta_0} = \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(y_i\left(x_{i2}-x_{02}\right)-\frac{\left(x_{i2}-x_{02}\right)\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)\right]$$

$$= \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(-\frac{\left(x_{i2}-x_{02}\right)\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\left(1-\frac{\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)\right)\right]$$

$$= \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(-\left(x_{i2}-x_{02}\right)\pi\left(x_i\right)\left(1-\pi\left(x_i\right)\right)\right)\right]$$

$$\frac{\partial(\partial\ell)}{\partial\beta_2\partial\beta_1} = \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(y_i\left(x_{i2}-x_{02}\right)-\frac{\left(x_{i2}-x_{02}\right)\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)\right]$$

$$= \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(-\frac{\left(x_{i2}-x_{02}\right)\left(x_{i1}-x_{01}\right)\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\left(1-\frac{\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)\right)\right]$$

$$= \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(-\left(x_{i2}-x_{02}\right)\left(x_{i1}-x_{01}\right)\pi\left(x_i\right)\left(1-\pi\left(x_i\right)\right)\right)\right]$$

$$\frac{\partial(\partial\ell)}{\partial\beta_2\partial\beta_2} = \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(y_i\left(x_{i2}-x_{02}\right)-\frac{\left(x_{i2}-x_{02}\right)\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)\right]$$

$$= \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(-\frac{\left(x_{i2}-x_{02}\right)\left(x_{i2}-x_{02}\right)\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\left(1-\frac{\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)\right)\right]$$

$$= \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(-\left(x_{i2}-x_{02}\right)\left(x_{i2}-x_{02}\right)\pi\left(x_i\right)\left(1-\pi\left(x_i\right)\right)\right)\right]$$

$$\frac{\partial(\partial\ell)}{\partial\beta_2\partial\beta_3} = \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(y_i\left(x_{i2}-x_{02}\right)-\frac{\left(x_{i2}-x_{02}\right)\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)\right]$$

$$= \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(-\frac{\left(x_{i2}-x_{02}\right)\left(x_{i3}-x_{03}\right)\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\left(1-\frac{\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)\right)\right]$$

$$= \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(-\left(x_{i2}-x_{02}\right)\left(x_{i3}-x_{03}\right)\pi\left(x_i\right)\left(1-\pi\left(x_i\right)\right)\right)\right]$$

d. Turunan kedua $\frac{\partial \ell}{\partial \beta_3}$ terhadap $\beta_0, \beta_1, \beta_2, \beta_3$

$$\frac{\partial(\partial \ell)}{\partial \beta_3 \partial \beta_0} = \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(y_i\left(x_{i3}-x_{03}\right)-\frac{\left(x_{i3}-x_{03}\right)\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)\right]$$

$$=\sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(-\frac{\left(x_{i3}-x_{03}\right)\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\left(1-\frac{\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)\right)\right]$$

$$=\sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(-\left(x_{i3}-x_{03}\right)\pi(x_i)\left(1-\pi(x_i)\right)\right)\right]$$

$$\frac{\partial(\partial \ell)}{\partial \beta_3 \partial \beta_1} = \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{j}-x_{ij}}{h_j}\right)\right)\left(y_i\left(x_{i3}-x_{03}\right)-\frac{\left(x_{i3}-x_{03}\right)\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)\right]$$

$$=\sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(-\frac{\left(x_{i3}-x_{03}\right)\left(x_{i1}-x_{01}\right)\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\left(1-\frac{\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)\right)\right]$$

$$=\sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(-\left(x_{i3}-x_{03}\right)\left(x_{i1}-x_{01}\right)\pi(x_i)\left(1-\pi(x_i)\right)\right)\right]$$

$$\frac{\partial(\partial \ell)}{\partial \beta_3 \partial \beta_2} = \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(y_i\left(x_{i3}-x_{03}\right)-\frac{\left(x_{i3}-x_{03}\right)\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)\right]$$

$$=\sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(-\frac{\left(x_{i3}-x_{03}\right)\left(x_{i2}-x_{02}\right)\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\left(1-\frac{\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)\right)\right]$$

$$=\sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(-\left(x_{i3}-x_{03}\right)\left(x_{i2}-x_{02}\right)\pi(x_i)\left(1-\pi(x_i)\right)\right)\right]$$

$$\frac{\partial(\partial \ell)}{\partial \beta_3 \partial \beta_3} = \sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(y_i\left(x_{i3}-x_{03}\right)-\frac{\left(x_{i3}-x_{03}\right)\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)\right]$$

$$=\sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(-\frac{\left(x_{i3}-x_{03}\right)\left(x_{i3}-x_{02}\right)\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\left(1-\frac{\exp(\mathbf{x\beta})}{1+\exp(\mathbf{x\beta})}\right)\right)\right]$$

$$=\sum_{i=1}^{362}\left[\prod_{j=1}^{3}\left(\frac{1}{h_j}K\left(\frac{x_{ij}-x_{0j}}{h_j}\right)\right)\left(-\left(x_{i3}-x_{03}\right)\left(x_{i3}-x_{03}\right)\pi(x_i)\left(1-\pi(x_i)\right)\right)\right]$$

Lampiran 5. Output Program RStudio Nilai *bandwidth (h)*, titik lokal (x_0) dan GCV pada Masing-Masing Prediktor

Nilai *bandwidth (h)*, titik lokal (x_0) dan GCV pada variabel prediktor x_1

Titik Lokal (x_0)	*Bandwidth (h)*	GCV
71,96129	2,0	0,09898
71,96129	1,9	0,09903
71,86631	2,0	0,09910
70,96129	1,8	0,09910
70,86631	1,9	0,09915
71,81882	2,0	0,09925
71,96129	1,7	0,09920
70,81882	1,9	0,09921
70,86631	1,8	0,09922
70,77132	2,9	0,09923

Nilai *bandwidth (h)*, titik lokal (x_0) dan GCV pada variabel prediktor x_2

Titik Lokal (x_0)	*Bandwidth (h)*	GCV
15,21431	2,8	0,09913
15,21431	2,9	0,09950
5,11829	3,8	0,10005
5,11829	3,7	0,10006
5,11829	3,6	0,10007
5,11829	3,5	0,10009
5,11829	3,4	0,10010
5,11829	3,3	0,10012
5,11829	3,2	0,10014
15,21431	3,0	0,10015

Nilai *bandwidth (h)*, titik lokal (x_0) dan GCV pada variabel prediktor x_3

Titik Lokal (x_0)	*Bandwidth (h)*	GCV
4,08948	10,0	0,10233
4,08948	10,1	0,10237
1,88756	10,9	0,10243
2,08948	10,3	0,10251
2,08948	10,9	0,10261
2,08948	10,8	0,10272
2,08948	10,7	0,10285
2,08948	10,6	0,10288
2.08948	10,5	0,10291
2.08948	10,4	0,10296