

Saya mengambil data jenis kayu bulat Agathis (saya melampirkan sumber data) tahun 2015, 2017 dan 2019, berturut-turut adalah 2.173, 3.269, 12.915.

Tahun diadopsikan x , sedangkan jumlah kayu bulat adalah y . Sehingga $x_0 = 2015$, $x_1 = 2017$ dan $x_2 = 2019$. Nilai $y_0 = 2.173$, $y_1 = 3.269$, $y_2 = 12.915$. dari ketiga titik saya buat $p_2(x)$. dari $p_2(x)$ saya coba prediksi jumlah kayu bulat tahun 2016.

Polinom Kuadratik

Diberikan $\ln(2015) = 2.173$

$$\ln(2017) = 3.264$$

$$\ln(2019) = 12.915$$

Ditanya : $\ln(2016)$ dan polinom kuadratik

Jawab

$$(x_0, y_0) = (2015, 2.173) \rightarrow a_0 + a_1 \cdot 2015 + a_2 \cdot 2015^2 = 2.173$$

$$(x_1, y_1) = (2017, 3.264) \rightarrow a_0 + a_1 \cdot 2017 + a_2 \cdot 2017^2 = 3.264$$

$$(x_2, y_2) = (2019, 12.915) \rightarrow a_0 + a_1 \cdot 2019 + a_2 \cdot 2019^2 = 12.915$$

$$= a_0 + 2015a_1 + 4060225a_2 = 2.173$$

$$a_0 + 2017a_1 + 4068289a_2 = 3.264$$

$$a_0 + 2019a_1 + 4076361a_2 = 12.915$$

→ Eliminasi gauss

$$\begin{bmatrix} a_0 + 2015 & + 4060225 \\ a_0 + 2017 & + 4068289 \\ a_0 + 2019 & + 4076361 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 2.173 \\ 3.264 \\ 12.915 \end{bmatrix}$$

NO. _____

DATE: _____

Polinom Lagrange orde 2

$$\text{Diketahui : } \ln(2015) = 2.173$$

$$\ln(2017) = 3.269$$

$$\ln(2019) = 12.915$$

Ditanya : $P_2(x) \rightarrow$ Lagrange orde 2

prediksi tahun $\ln(2016)$ dgn $P_2(x)$

$$\text{Jawab : } (x_0, y_0) = (2015, 2.173)$$

$$(x_1, y_1) = (2017, 3.269)$$

$$(x_2, y_2) = (2019, 12.915)$$

$$P_2(x) = y_0 \cdot L_0 + y_1 \cdot L_1 + y_2 \cdot L_2$$

$$L_0 = \frac{(x - x_1)(x - x_2)}{(x_0 - x_1)(x_0 - x_2)} = \frac{(x - 2017)(x - 2019)}{(2015 - 2017)(2015 - 2019)}$$

$$= \frac{(x - 2017)(x - 2019)}{(-2)(-4)} = \frac{(x - 2017)(x - 2019)}{8}$$

$$L_1 = \frac{(x - x_0)(x - x_2)}{(x_1 - x_0)(x_1 - x_2)} = \frac{(x - 2015)(x - 2019)}{(2017 - 2015)(2017 - 2019)}$$

$$= \frac{(x - 2015)(x - 2019)}{-4}$$

NO. _____

DATE: _____

$$L_2 = \frac{(x-x_0)(x-x_1)}{(x_2-x_0)(x_2-x_1)} = \frac{(x-2015)(x-2017)}{(2019-2015)(2019-2017)}$$

$$= \frac{(x-2015)(x-2017)}{8}$$

Jadi polinom lagrange orde 2 ($P_2(x)$) adalah

$$P_2(x) = 2.173 \frac{(x-2017)(x-2019)}{8} + 3.264 \frac{(x-2015)(x-2019)}{-4}$$

$$+ 12.915 \frac{(x-2015)(x-2017)}{8}$$

$$\ln(2016) \approx P_2(2016)$$

$$= 2.173 \frac{(2016-2017)(2016-2019)}{8} + 3.264 \frac{(2016-2015)(2016-2019)}{-4}$$

$$+ 12.915 \frac{(2016-2015)(2016-2017)}{8}$$

$$= 271.625 (-1)(-3) - 816 (1)(-3) + 16143 (1)(-1)$$

$$= 814875 + 2448 - 16143$$

$$= 80118$$

nilai $\ln(2016) \approx 80118$ (by lagrange orde 2)

Polinom Newton

$$\text{Diketahui : } \ln(2015) = 2.173$$

$$\ln(2017) = 3.264$$

$$\ln(2019) = 12.915$$

Ditanya : $\ln(2016)$ dan polinom newton orde 2 ($P_2(x)$)

Jawab

$$P_2(x) = a_0 + a_1(x-x_0) + a_2(x-x_0)(x-x_1)$$

i	x_i	$F(x_i)$	ST.1	ST.2
0	2015	2.173	0,5455	1,07
1	2017	3.264	4,8255	
2	2019	12.915		

$$F[x_1, x_0] = \frac{F(x_1) - F(x_0)}{x_1 - x_0} = \frac{3.264 - 2.173}{2017 - 2015} = 0.5455$$

$$F[x_2, x_1] = \frac{12.915 - 3.264}{2019 - 2017} = 4,8255$$

$$F[x_2, x_1, x_0] = \frac{F[x_2, x_1] - F[x_1, x_0]}{x_2 - x_0}$$

$$= \frac{4,8255 - 0,5455}{2019 - 2015} = 1,07$$

NO. _____

DATE: _____

Sehingga

$$p_2(x) = 2.173 + 0.5455(x-2015) - 1.07(x-2015)(x-2017)$$

$$\ln(2016) \approx p_2(x) = 2.173 + 0.5455(2016-2015) -$$

$$- 1.07(2016-2015)(2016-2017)$$

$$= 2.173 + 0.5455 - 1.07$$

$$= 1.6485 \rightarrow \text{newton orde 2}$$