Statistika dan Probabilitas

Frekuensi Yang dinormalkan.

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- Interpolasi Distribusi Normal
- Interpolasi Garis Lurus
- ▲ frekuensi u yang dinormalkan
- ▲ frekuensi / Jumlah yang dinormalkan

Lengkapilan tabel berikut

i	xi	fi	Fi	fi[%]	Fi[%]	u•	u•	P{u'} ▲	P{x'} ▲	f(x') ▲
1	2	7	7	7.8652	7.8652	-1.4337	-1.3856	0.1528	0.0853	7.5917
2	3	12	19	13.4831	21.3483	-0.7969	-0.8347	0.2816	0.1571	13.9819
3	4	16	35	17.9775	39.3258	-0.2682	-0.2838	0.3832	0.2138	19.0282
4	5	20	55	22.4719	61.7978	0.2985	0.2671	0.3850	0.2148	19.1172
5	6	15	70	16.8539	78.6517	0.7969	0.8180	0.2855	0.1593	14.1777
6	7	11	81	12.3596	91.0112	1.3528	1.3689	0.1563	0.0872	7.7608
7	8	8	89	8.9888	100	-	-	-	-	-

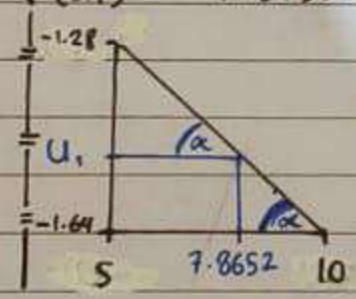
Mencari u interpolasi garis lurus

Dengan menggunakan informasi pada tabel distribusi kumulatif normal standar.

Diketahui : $Fi[\%] = P\{u\}$

→ Mencari u_1 : $P\{u_1\} = 7.8652\ \%$

* $P_{(-1.64)} = 5\ \%$
* $P_{(-1.28)} = 10\ \%$



$$\tan\alpha = \frac{-1.28-(-1.64)}{10-5} = \frac{-1.28-u_1}{10-7.8652}$$

$$\frac{0.36}{5} = \frac{-1.28-u_1}{2.1348}$$

$$0.7685 = -6.4 - 5u_1$$

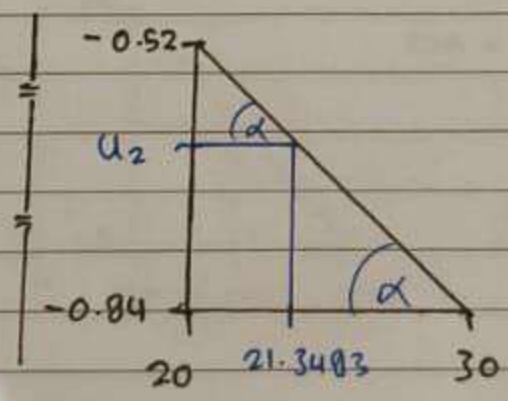
$$u_1 = \frac{-6.4-0.7685}{5}$$

$$u_1 = -1.4337$$

→ Mencari u_2 :

* $P_{(-0.84)} = 20\ \%$
* $P_{(-0.52)} = 30\ \%$

$P_{(u_2)} = 21.3483\ \%$



$$\tan\alpha = \frac{-0.52-(-0.84)}{30-20} = \frac{-0.52-u_2}{30-21.3483}$$

$$\frac{0.32}{10} = \frac{-0.52-u_2}{8.6517}$$

$$2.7685 = -5.2 - 10u_2$$

$$u_2 = \frac{-5.2-2.7685}{10}$$

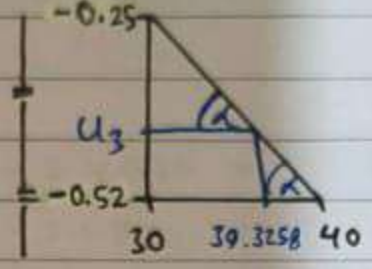
$$u_2 = -0.7969$$

→ Mencari u_3

* $P_{(-0.52)} = 30\%$

  $P_{(u_3)} = 39.3258\ \%$

* $P_{(-0.25)} = 40\%$



$$\tan\alpha = \frac{-0.25-(-0.52)}{40-30} = \frac{-0.25-u_3}{40-39.3258}$$

$$\frac{0.27}{10} = \frac{-0.25-u_3}{0.6742}$$

$$0.1820 = -2.5 - 10u_3$$

$$u_3 = \frac{-2.5-0.1820}{10}$$

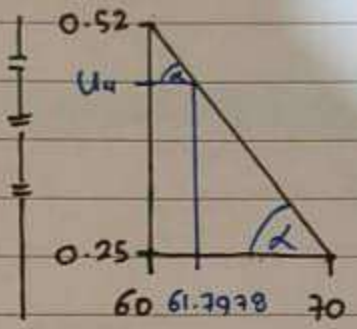
$$u_3 = -0.2682$$

→ Mencari u_4

* $P_{(0.25)} = 60\ \%$

  $P_{(u_4)} = 61.7978\ \%$

* $P_{(0.52)} = 70\ \%$



$$\tan\alpha = \frac{0.52-0.25}{70-60} = \frac{0.52-u_4}{70-61.7978}$$

$$\frac{0.27}{10} = \frac{0.52-u_4}{8.2022}$$

$$2.2146 = 5.2 - 10u_4$$

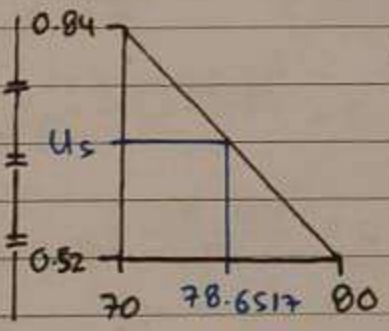
$$u_4 = \frac{5.2-2.2146}{10} = 0.2985$$

→ Mencari u_5

* $P_{(0.52)} = 70\ \%$

  $P_{(u_5)} = 78.6517\ \%$

* $P_{(0.84)} = 80\ \%$



$$\tan\alpha = \frac{0.84-0.52}{80-70} = \frac{0.84-u_5}{80-78.6517}$$

$$\frac{0.32}{10} = \frac{0.84-u_5}{1.3483}$$

$$0.4315 = 8.4 - 10u_5$$

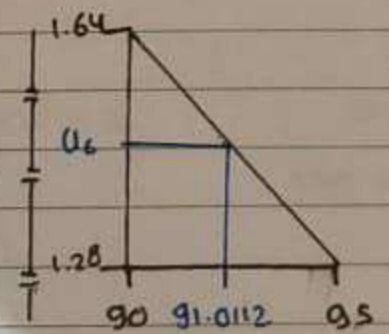
$$u_5 = \frac{8.4-0.4315}{10} = 0.7969$$

→ Mencari u_6

* $P_{(1.28)} = 90\ \%$

  $P_{(u_6)} = 91.0112\ \%$

* $P_{(1.64)} = 95\ \%$



$$\tan\alpha = \frac{1.64-1.28}{95-90} = \frac{1.64-u_6}{95-91.0112}$$

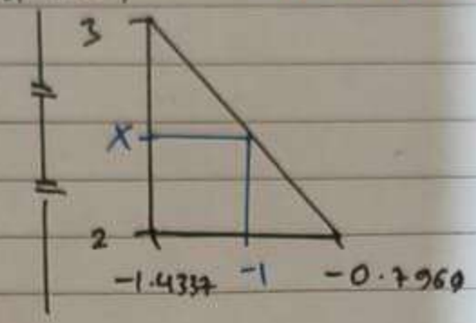
$$\frac{0.36}{5} = \frac{1.64-u_6}{3.9888}$$

$$1.4360 = 8.2 - 5u_6$$

$$u_6 = \frac{8.2-1.4360}{5} = 1.3528$$

→ Mencari $u = -1$ $\xi - \sigma \rightarrow u = -1$

x	u
2	-1.4337
?	-1
3	-0.7969



$$\tan \alpha = \frac{3-2}{-0.7969+1.4337} = \frac{3-x}{-0.7969+1}$$

$$= \frac{1}{0.6368} = \frac{3-x}{0.2031}$$

$$= 0.2031 = 1.9104 - 0.6368x$$

$$x = \frac{1.9104 - 0.2031}{0.6369}$$

$$x = 2.6811$$

→ Mencari standar deviasi

Maka : $\xi - \sigma = u = -1$

$\xi = 4.4733$ $\boxed{u = -1 \Rightarrow 2.6811}$

$4.4733 - \sigma = 2.6811$

$\sigma = 4.4733 - 2.6811$

$\boxed{\sigma = 1.7922}$

→ Mencari $P\{x'\}$ $\quad P\{x'\} = \frac{P\{u'\}}{\sigma}$

- $P\{x_1'\} = \frac{0.1528}{1.7922} = 0.0853$
- $P\{x_2'\} = \frac{0.2816}{1.7922} = 0.1571$
- $P\{x_3'\} = \frac{0.3832}{1.7922} = 0.2138$
- $P\{x_4'\} = \frac{0.3850}{1.7922} = 0.2148$
- $P\{x_5'\} = \frac{0.2855}{1.7922} = 0.1593$
- $P\{x_6'\} = \frac{0.1563}{1.7922} = 0.0872$

(toleransi alat ukur $\Delta = 1$, $n = 89$

Mencari $f(x')$ $\Rightarrow$ $f(x') = P\{x'\} \cdot \Delta \, n$

Maka

- $f(x_1') = 0.0853 \cdot 1 \cdot 89 = 7.5917$
- $f(x_2') = 0.1571 \cdot 1 \cdot 89 = 13.9819$
- $f(x_3') = 0.2138 \cdot 1 \cdot 89 = 19.0282$
- $f(x_4') = 0.2148 \cdot 1 \cdot 89 = 19.1172$
- $f(x_5') = 0.1593 \cdot 1 \cdot 89 = 14.1777$
- $f(x_6') = 0.0872 \cdot 1 \cdot 89 = 7.7608$

Mencari u interpolasi garis lurus

Nilai Y yg didapat dari excel : $Y = 0.5509x - 2.4874$

Maka :

- $u_1 = 0.5509(2) - 2.4874 = -1.3856$
- $u_2 = 0.5509(3) - 2.4874 = -0.8347$
- $u_3 = 0.5509(4) - 2.4874 = -0.2838$
- $u_4 = 0.5509(5) - 2.4874 = 0.2671$
- $u_5 = 0.5509(6) - 2.4874 = 0.8180$
- $u_6 = 0.5509(7) - 2.4874 = 1.3689$

Mencari P{u'} Frekuensi u yg dinormalkan

Diketahui : $P\{u'\} = \frac{1}{\sqrt{2\pi}} e^{-\frac{u^2}{2}}$

Maka :

$P\{u_1'\} = \frac{1}{\sqrt{2\pi}} e^{-\frac{(-1.3856)^2}{2}} = 0.1528$

$P\{u_2'\} = \frac{1}{\sqrt{2\pi}} e^{-\frac{(-0.8347)^2}{2}} = 0.2816$

$P\{u_3'\} = \frac{1}{\sqrt{2\pi}} e^{-\frac{(-0.2838)^2}{2}} = 0.3832$

$P\{u_4'\} = \frac{1}{\sqrt{2\pi}} e^{-\frac{0.2671^2}{2}} = 0.3850$

$P\{u_5'\} = \frac{1}{\sqrt{2\pi}} e^{-\frac{0.8180^2}{2}} = 0.2855$

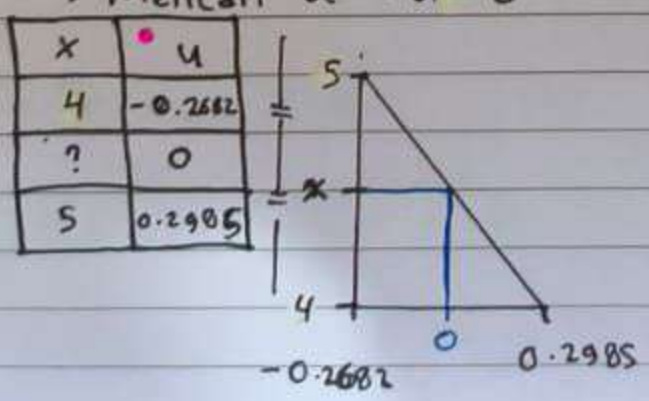
$P\{u_6'\} = \frac{1}{\sqrt{2\pi}} e^{-\frac{1.3689^2}{2}} = 0.1563$

* Mencari P{x'} Frekuensi / Jumlah Yg dinormalkan

Diketahui : $P\{x'\} = \frac{P\{u'\}}{\sigma}$ $\quad \xi - \sigma = u = -1$

→ Mencari $\xi \rightarrow u = 0$

x	u
4	-0.2682
?	0
5	0.2985



Jika $u = 0$ maka $\xi = x$

$$\tan \alpha = \frac{5-4}{0.2985-(-0.2682)} = \frac{5-x}{0.2985-0}$$

$$\frac{1}{0.5667} = \frac{5-x}{0.2985}$$

$$0.2985 = 2.8335 - 0.5667x$$

$$x = \frac{2.8335 - 0.2985}{0.5667}$$

$$x = \xi = 4.4733$$

Kurva Pemeriksa Kenormalan