

BASIC STATISTICS

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Uji beda dua rata-rata sampel independent dan dependent

$$1.) H_0 : \mu_1 = \mu_2$$

$$H_1 : \mu_1 \neq \mu_2$$

$$t_{stat} = \frac{(\bar{x}_1 - \bar{x}_2)}{\sqrt{S_p^2 \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}}$$

$$\bar{x}_1 = \frac{44 + 45 + 46 + \dots + 44}{15}$$

$$= 44,067$$

$$\approx 44,07$$

$$S_p^2 = \frac{(n_1 - 1)(S_1^2) + (n_2 - 1)(S_2^2)}{(n_1 - 1) + (n_2 - 1)}$$

$$\bar{x}_2 = \frac{40 + 42 + 43 + \dots + 42}{10}$$

$$= 42,3$$

$$S_1^2 = \frac{\sum (x_{1i} - \bar{x}_1)^2}{n_1 - 1} = \frac{(44 - 44,07)^2 + (45 - 44,07)^2 + \dots + (44 - 44,07)^2}{15 - 1}$$

$$= \frac{54,9335}{14}$$

$$= 3,9238$$

$$\approx 3,924$$

$$S_2^2 = \frac{\sum (x_{2i} - \bar{x}_2)^2}{n_2 - 1} = \frac{(40 - 42,3)^2 + (42 - 42,3)^2 + \dots + (42 - 42,3)^2}{10 - 1}$$

$$= \frac{22,1}{9}$$

$$= 2,455$$

$$S_p^2 = \frac{(n_1 - 1)(S_1^2) + (n_2 - 1)(S_2^2)}{(n_1 - 1) + (n_2 - 1)}$$

$$= \frac{(14)(3,924) + (9)(2,455)}{14 + 9}$$

$$= \frac{54,9335 + 22,1}{23}$$

$$= 3,349$$

$$\approx 3,35$$

$$t_{stat} = \frac{(\bar{x}_1 - \bar{x}_2)}{\sqrt{S_p^2 \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}}$$

$$= \frac{44,07 - 42,3}{\sqrt{3,35 \left(\frac{1}{15} + \frac{1}{10} \right)}}$$

$$= \frac{1,77}{\sqrt{3,35 \left(\frac{5}{30} \right)}}$$

$$= \frac{1,77}{\sqrt{3,35 \left(\frac{1}{6} \right)}} = \frac{1,77}{0,7472}$$

$$= 2,3698$$

$$\approx 2,369$$

$$t_{\text{tabel}} = t_{\frac{\alpha}{2}, df}$$

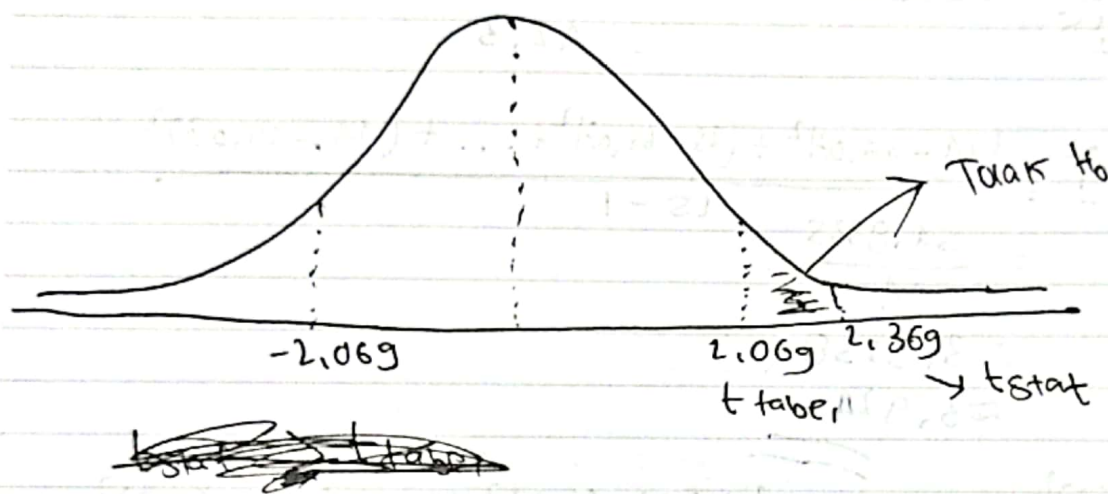
$$\alpha = 0.05 \rightarrow 1 - 0.95$$

$$df = n_1 + n_2 - 2$$

$$= 15 + 10 - 2$$

$$= 23$$

$$t_{\frac{0.05}{2}, 23} = t_{0.025, 23} = 2.069$$



$$t_{\text{stat}} > t_{\text{tabel}} \Rightarrow \text{Tolak } H_0$$

Kesimpulan : Benar terdapat perbedaan rata-rata masa penyelesaian tugas dari kedua kelompok.

2. No.	I	II	$D_i = (I - II)$
1	11	16.5	-5.5
2	12	16.5	-4.5
3	12	12.25	-0.25
4	9.5	10	0.5
5	14.5	13.5	1.5
6	12	15.75	-3.75
7	10.5	15.5	-5
8	11.5	14.5	-3
9	11	11	0
10	16	15	1
	Jumlah		-19

$$\bar{D} = \frac{\sum D_i}{n}$$

$$= \frac{-19}{10}$$

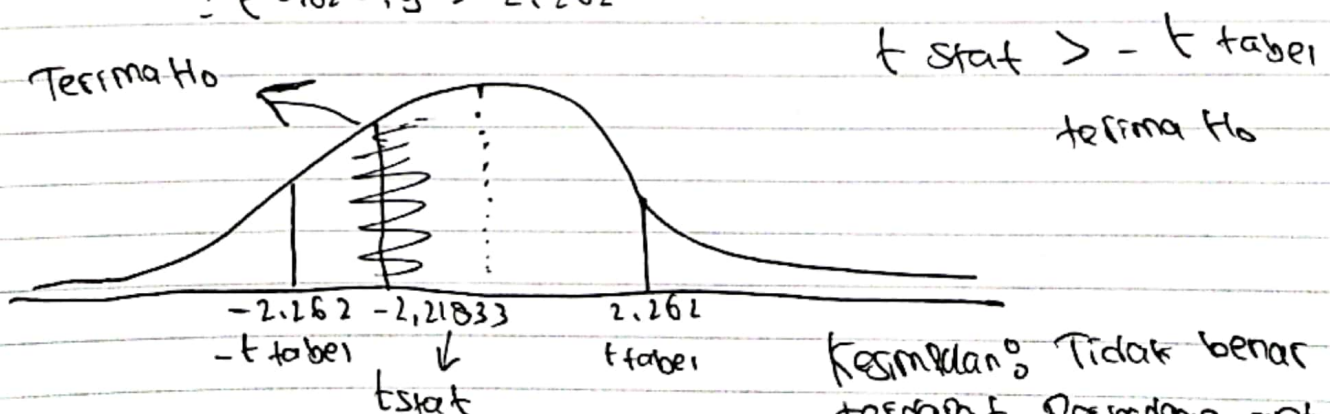
$$= -1.9$$

$$\begin{aligned}
 S_D &= \sqrt{\frac{\sum_{i=1}^n (D_i - \bar{D})^2}{n-1}} \\
 &= \sqrt{\frac{(-5.5 - (-1.9))^2 + (-4.5 - (-1.9))^2 + \dots + (1 - (-1.9))^2}{10-1}} \\
 &= \sqrt{\frac{66.025}{9}} \\
 &= \sqrt{7.336} \\
 &= 2.7085
 \end{aligned}$$

$$t_{stat} = \frac{\bar{D}}{\frac{S_D}{\sqrt{n}}} = \frac{-1.9}{\frac{2.7085}{\sqrt{10}}} = \frac{-1.9}{0.8565} = -2.21833$$

$$\begin{aligned}
 t_{tabel} &= t_{\frac{\alpha}{2}, df} \\
 \alpha &= 0.05 \\
 df &= n-1 = 10-1 \\
 &= 9
 \end{aligned}$$

$$\begin{aligned}
 t_{\frac{\alpha}{2}, df} &= t_{\frac{0.05}{2}, 9} \\
 &= t_{0.025, 9} = 2.262
 \end{aligned}$$



Kesimpulan: Tidak benar terdapat perbedaan antara cara pemb. 1 dan cara pemb. 2