## Analisis Kovarians
## (Uji ANCOVA)

### A. Tabel Umum

| No. | Treatment A (A1) | | | | | Treatment B (A2) | | | | | $\Sigma N$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | X | $X^2$ | Y | $Y^2$ | XY | X | $X^2$ | Y | $Y^2$ | XY | |
| 1 | 175 | 30625 | 135 | 18225 | 23625 | 205 | 42025 | 165 | 27225 | 33825 | A = treatment |
| 2 | 175 | 30625 | 145 | 21025 | 25375 | 175 | 30625 | 195 | 38025 | 34125 | A1, A2 = Var. indepenc |
| 3 | 235 | 55225 | 205 | 42025 | 48175 | 230 | 52900 | 160 | 25600 | 36800 | |
| 4 | 215 | 46225 | 175 | 30625 | 37625 | 190 | 36100 | 155 | 24025 | 29450 | |
| 5 | 195 | 38025 | 140 | 19600 | 27300 | 155 | 24025 | 150 | 22500 | 23250 | |
| 6 | 195 | 38025 | 190 | 36100 | 37050 | 185 | 34225 | 170 | 28900 | 31450 | |

### B. Tabel Statistik

| Statistik | A1 | A2 | Total |
|---|---|---|---|
| $\Sigma N$ | 6 | 6 | 12 |
| $\Sigma X$ | 1.190 | 1.140 | 2.330 |
| $\Sigma X^2$ | 238.750 | 21.9900 | 458.650 |
| $\Sigma Y$ | 990 | 995 | 1.985 |
| $\Sigma Y^2$ | 167.600 | 166.275 | 333.875 |
| $\Sigma XY$ | 199.150 | 188.900 | 388.050 |
| $\bar{X}$ | 198,33 | 190 | 388,33 |
| $\bar{Y}$ | 165 | 165,83 | 330,83 |

### C. Perhitungan ANCOVA

i) Sumber Variasi Total (Residu)

1. $JK_{Y_t} = \Sigma y^2_t$

$$= \Sigma Y^2_t - \frac{(\Sigma Y_t)^2}{N}$$

$$= 333.875 - \frac{(1.985)^2}{12}$$

$$= 5.522,916667$$

2. $JK_{X_t} = \Sigma x^2_t$

$$= \Sigma X^2_t - \frac{(\Sigma X_t)^2}{N}$$

$$= 458.650 - \frac{2.330^2}{12}$$

$$= 6.241,666.7$$

3. $JP_{XY_t} = \Sigma xy$

$$= \Sigma XY - \frac{(\Sigma X)(\Sigma Y)}{N}$$

$$= 388.050 - ((2.330 \times 1.985)/12)$$

$$= 2.629,166.7$$

4. $Beta_t = \frac{\Sigma xy}{\Sigma x^2_t}$

$$= 2.629,16.7 / 6.241,66.7$$

$$= 0,421228304$$

5. $JK_{regresi_t} = \beta \times \Sigma xy$

$$= 0,421228304 \times 2.629,..$$

$$= 1.107,479417$$

6. $JK_{residu_t} = JK_{Y_t} - JK_{regresi_t}$

$$= 5.522,916.7 - 1.107,479...$$

$$= 4.415,4372$$

No. _____
Date: _____

a = banyaknya metode
N = total semua data
M = var. kontrol

No. _____
Date: _____

**ii) Sumber Variasi Dalam (JK dalam Residu)**

1. $JK_{Yd} = \sum y_t^2 = \sum Y_t^2 - \sum \frac{(\sum Y_A)^2}{nA}$

$$= 333.8\overline{5} - \left(\frac{900}{6} + \frac{995}{6}\right)^2$$

$$= 5.520,833$$

2. $JK_{Xd} = \sum x_t^2 = \sum x_t^2 - \sum \frac{(\sum X_A)^2}{nA}$

$$= 6.241,.. - \left(\frac{1190}{6} + \frac{1140}{6}\right)^2$$

$$= 6.033,33$$

3. $JP_{XYd} = \sum xy = \sum XY - \sum \frac{(\sum X_A)(\sum Y_A)}{nA}$

$$= 388.050 - \left(\left(\left(\frac{1190}{6}\right)\left(\frac{900}{6}\right)\right) + \left(\left(\frac{1140}{6}\right)\left(\frac{995}{6}\right)\right)\right)$$

$$= 2.650$$

4. $Beta_d = \frac{\sum xy}{\sum x_t^2}$

$$= 2.629,.. / 6.241,...$$

$$= 0,439227$$

5. $JK_{regresi\,d} = \beta d \times \sum xy$

$$= 0,439227 \times 2.629,..$$

$$= 1.163,95$$

6. $JK_{residu\,d} = JK_{Yd} - JK_{regresi\,d}$

$$= 5.520,.. - 1.163,..$$

$$= 4.356,883$$

**iii) Sumber Variasi Antar**

$JK_A = JK_{residu\,t} - JK_{residu\,d}$

$$= 4.415,.. - 4.356,...$$

$$= 58,5542$$

**iv) Menghitung Derajat Kebebasan**

1. $DK_A = a - 1$
   $$= 2 - 1$$
   $$= 1$$

2. $DK_D = N - a - m$
   $$= 12 - 2 - 1$$
   $$= 9$$

3. $DK_T = N - 1 - m$
   $$= 12 - 1 - 1$$
   $$= 10$$

**v) Menghitung Rata-Rata Kuadrat**

1. $RK_A = JK_A / DK_A$
   $$= 58,5542 / 1$$
   $$= 58,5549$$

2. $RK_D = JK_D / DK_D$
   $$= 4.356,8829 / 9$$
   $$= 484,0981$$

**vi) Menghitung harga F**

1. $F_{hitung} = RK_A / RK_B$
   $$= 58,5542 / 484,0981$$
   $$= 0,120955$$

2. $F_{tabel} = (1 - \alpha ; DK\,Antar ; DK\,dalam)$
   $$= (1 - 0,05 ; 1 ; 9)$$
   $$= 5,12$$

**D. Rangkuman Tabel ANCOVA**

| Statistik | Jk | Dk | Rk | Fhit | F tabel (0,05) |
|---|---|---|---|---|---|
| Antar | JKA | DKA | RKA | | |
| Dalam (eror) | Jkresd | DKD | RKD | | |
| Total (residu) | Jkrest | DKT | - | | |

| NO | Statistik | Jk | Dk | Rk | Fhitung | F tabel (0,05 = 5%) |
|---|---|---|---|---|---|---|
| 1 | Antar | 58,5542 | 1 | 58,5542 | 0,1209552 | 5,12 |
| 2 | Dalam (error) | 4.356,883057 | 9 | 484,098 | | |
| 3 | Total (residu) | 4.415,4372 | 10 | - | | |

**E. Uji ANCOVA**

**i) Pasangan Hipotesis**

$H_0 : \mu_1 = \mu_2$ (tidak terdapat perbedaan nilai variabel X antara yg menggunakan metode treatment $A_1$ dan metode treatment $A_2$)

$H_1 : \mu_1 \neq \mu_2$ (terdapat perbedaan nilai variabel X antara yg menggunakan metode treatment $A_1$ dan $A_2$)

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ii) Taraf nyata

$\alpha = 5\% = 0,05$

iii) Statistik Uji

Perhitungan uji ANCOVA dan hasilnya, terlampir pada
indeks D. Rangkuman Tabel ANCOVA

iv) Kriteria Uji

$F_{hitung} = 0,12096$

$F_{tabel} = 5,12$

$F_{hit} < F_{tabel}$, maka Ho diterima dan Hi ditolak.

v) Kesimpulan

Setelah dikendalikan oleh kovariabel, tidak terdapat perbedaan
nilai variabel independen antara yg menggunakan metode
treatment $A_1$ dan $A_2$.

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### Analisis Korelasi

X = Hours playing video games per week

Y = Test score

| No | X | $X^2$ | Y | $Y^2$ | XY |
|----|-----|------|---|----|-----|
| 1 | 2 | 4 | 8 | 64 | 16 |
| 2 | 2 | 4 | 3 | 9 | 6 |
| 3 | 1,5 | 2,25 | 5 | 25 | 7,5 |
| 4 | 1 | 1 | 7 | 49 | 7 |
| 5 | 2,5 | 6,25 | 1 | 1 | 2,5 |
| 6 | 3 | 9 | 2 | 4 | 6 |
| 7 | 1,5 | 2,25 | 6 | 36 | 9 |
| 8 | 2 | 4 | 7 | 49 | 14 |
| 9 | 2 | 4 | 4 | 16 | 8 |
| 10 | 1,5 | 2,25 | 9 | 81 | 13,5 |

1) $\Sigma N = 10$

$\Sigma X = 19$

$\Sigma X^2 = 39$

$\Sigma Y = 52$

$\Sigma Y^2 = 334$

$\Sigma XY = 89,5$

2) Koefisien korelasi (r)

$$r_{xy} = \frac{n\Sigma XY - \Sigma X \Sigma Y}{\sqrt{(n\Sigma X^2 - (\Sigma X)^2)(n\Sigma Y^2 - (\Sigma Y)^2)}}$$

$$r_{xy} = \frac{10(89,5) - (19)(52)}{\sqrt{(10(39) - (19)^2)(10(334) - (52)^2)}}$$

$$r_{xy} = -0,684786818$$

3) Dengan nilai koefisien ~~regresi~~ korelasi $r_{xy}$
sebesar $-0,684786818$ maka korelasi
yang terjadi adalah negatif kuat
antara korelasi variabel X dgn Y.