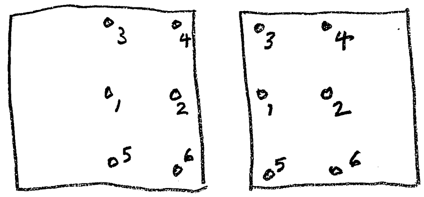
Adj. of Geospa. Obs. CE597 HW5 11 Nov, 2019

1. Use GLS (mixed model), with updating of observations, to solve the relative orientation problem, with observations:

	Left (mm)		Right (mm)	
	x_1	y_1	x_2	y_2
1.	0.998	−1.399	−62.957	−1.771
2.	58.566	1.197	−3.690	−3.499
3.	0.395	68.601	−56.893	67.638
4.	60.912	69.739	3.307	63.201
5.	−0.591	−68.443	−71.323	−72.272
6.	61.279	−70.466	−6.617	−78.009



$x_0 = .010$ mm

$y_0 = .004$ mm

$f = 100.000$ mm

use $b_x = 100.000$

$\sigma = .005$ mm

use approximations:

$b_y \approx 0$

$b_z \approx 0$

$\omega \approx 0$

$\varphi \approx 0$

$\kappa \approx 0$

- Make 2-sided global test on ref. var. @ $\alpha = .05$
- Make 99% confidence interval for ω (omega)
- Make 99% confidence region for (b_y, b_z)
- Do you notice any unexpected pattern in the residuals?

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2. Use GLS (mixed model), with updating of observations, to solve the 7-parameter transformation problem, with observations:

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XYZ =
    1.0103    0.8515    0.9592
    5.0008    1.0167    1.0258
    5.0412    4.0569    1.0505
    0.9189    4.0404    0.9767
    3.0356    2.4440    3.5792
    1.0084    0.9307    6.0628
    5.0235    0.9795    5.9659
    5.0810    4.0219    6.0633
    0.9438    4.0637    5.9929
xyz =
    2.0922   -1.9149    3.2875
    6.7509   -1.2455    3.9159
    6.3389    2.2944    3.5673
    1.5333    1.5963    3.0512
    3.8042    0.2725    6.3617
    1.3498   -1.6061    9.2617
    6.1696   -0.9419    9.8189
    5.6185    2.4868    9.5223
    0.8239    1.8284    9.0924
```

$\sigma = 0.05$

Model: $\begin{pmatrix} x \\ y \\ z \end{pmatrix} = \lambda M \begin{pmatrix} X \\ Y \\ Z \end{pmatrix} + \begin{pmatrix} t_x \\ t_y \\ t_z \end{pmatrix}$.

$$F = \begin{pmatrix} x \\ y \\ z \end{pmatrix} - \lambda M \begin{pmatrix} X \\ Y \\ Z \end{pmatrix} - \begin{pmatrix} t_x \\ t_y \\ t_z \end{pmatrix} = \begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}$$

use approximations: $\lambda^\circ = 1.0$, $\omega^\circ = 3^\circ$, $\varphi^\circ = 5^\circ$, $\kappa = -8^\circ$

$t_x = 1.0$, $t_y = -3.0$, $t_z = 2.0$

- Make 2 sided global test on ref. var. @ $\alpha = .05$
- Make 50% confidence interval for λ
- Make 50% confidence region for (t_x, t_y)