(a)   RMS listed for each control point with an average for all points

RMS for a tic = sqrt [(actX - estX)² + (act Y-estY)²]

Average RMS for all Points = sqrt [(sum of squares of deviation in X and Y) / (no. of control points)]

(i.e. for average, add up all of the (actX - estX)² and (act Y-estY)² caluclations and divide by the total number of control points, take the square root)

where
actX = actual X coordinate location of point
actY = actual Y coordinate location of point
estX = estimated X coordinate location of point
estY = estimated Y coordinate location of point

In-Class Exercise

Calculate the RMS for each of the control tics below, and the average RMS. Coordinates are in UTM meters.
Show all of your work.

Control Pt.	actX	estX	actY	estY	RMS
1	481023.334	481029.71	4966231.786	4966234.25	6.835
2	481592.256	481596.89	4966834.765	4966854.32	20.097
3	481018.448	481044.76	4966245.354	4966251.87	27.107
4	481402.309	481499.72	4966845.274	4966839.71	97.570

AVE. RMS = 37.902

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1. $\overset{act\ X}{481023.334} - \overset{est\ X}{481029.71} = -6.376$

$(-6.376)^2 = 40.653$

$\overset{act\ Y}{4966231.786} - \overset{est\ Y}{4966234.25} = -2.464$

$(-2.464)^2 = 6.071$

$40.653 + 6.071 = 46.724$

$\sqrt{46.724} = 6.835$

1, RMS = 6.835

2. $\overset{act\ X}{481592.256} - \overset{est\ X}{481596.89} = -4.634$

$(-4.634)^2 = 21.474$

$4966834.765 - 4966854.32 = -19.555$

$(-19.555)^2 = 382.398$

$21.474 + 382.398 = 403.872$

$\sqrt{403.872} = 20.097$

3. $\overset{Act\ X}{481018.448} - \overset{est\ X}{481044.76} = -26.312$

$(26.312)^2 = 692.321$

$\overset{Act\ Y}{4966245.354} - \overset{est\ Y}{4966251.87} = -6.516$

$(-6.516)^2 = 42.458$

$692.321 + 42.458 = \overset{734.779}{734.779}$

$\sqrt{734.779} = 27.107$

4.   ↓ over