

```
clc
close all
clear all

% Resources:
% https://www.mathworks.com/help/vision/ref/estimatefundamentalmatrix.html
% https://www.mathworks.com/help/vision/ug/single-camera-calibration.html
% https://www.mathworks.com/help/vision/examples/evaluating-the-accuracy-of-single-
camera-calibration.html
% Hartley, R., A. Zisserman, Multiple View Geometry in Computer Vision, Cambridge
University Press, 2003.

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% Evaluating the Accuracy of Single Camera Calibration %
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% Calibrate camera
% Create a set of calibration images.
CalImgFolder = 'Y:\...\ComputerVision\calibration_pics';
addpath(CalImgFolder);
images = imageSet(CalImgFolder);
imageFileNames = images.ImageLocation

% Detect calibration pattern.
[imagePoints, boardSize] = detectCheckerboardPoints(imageFileNames);

% Generate world coordinates of the corners of the squares.
squareSize = 20; % millimeters
worldPoints = generateCheckerboardPoints(boardSize, squareSize);

% Calibrate the camera.
I = readimage(images, 1);
imageSize = [size(I, 1), size(I, 2)];
[params, ~, estimationErrors] = estimateCameraParameters(imagePoints, worldPoints, ...
    'ImageSize', imageSize);

% Visualize camera extrinsics. See below for both locations.
% figure;
% showExtrinsics(params);
% plotting relative locations of the camera and the calibration pattern
figure;
showExtrinsics(params, 'CameraCentric');

figure;
showExtrinsics(params, 'PatternCentric');

% Measuring calibration accuracy: Reprojection Errors
figure;
showReprojectionErrors(params);

% Plot detected and reprojected points.
figure;
```

```

imshow(imageFileNames{1});
hold on;
plot(imagePoints(:,1,1), imagePoints(:,2,1), 'go');
plot(params.ReprojectedPoints(:,1,1), params.ReprojectedPoints(:,2,1), 'r+');
legend('Detected Points', 'ReprojectedPoints');
hold off;

```

```
% Estimation Errors
```

```
displayErrors(estimationErrors, params);
```

```
% Standard Errors of Estimated Camera Parameters
```

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% -----
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%
```

```
% Intrinsics
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% -----
```

```

% Focal length (pixels):    [ 1333.5591 +/- 1.4018      1337.2177 +/- 1.3073 ]
% Principal point (pixels): [ 736.9582 +/- 1.4695      541.2516 +/- 1.2998 ]
% Radial distortion:       [ -0.1834 +/- 0.0025      0.0283 +/- 0.0141 ]

```

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%
```

```
% Extrinsics
```

```
% -----
```

```
% Rotation vectors:
```

```

%          [ -0.1970 +/- 0.0013      -0.7234 +/- 0.0013      1.3876 ✓
+/- 0.0005 ]
%          [  0.0410 +/- 0.0014      -0.5312 +/- 0.0015      1.4754 ✓
+/- 0.0005 ]
%          [  0.1889 +/- 0.0017      -0.4029 +/- 0.0017      1.5205 ✓
+/- 0.0005 ]
%          [  0.2880 +/- 0.0019      -0.3109 +/- 0.0019      1.5477 ✓
+/- 0.0004 ]
%          [  0.4443 +/- 0.0017      -0.1626 +/- 0.0017      1.5861 ✓
+/- 0.0004 ]
%          [  0.6802 +/- 0.0015        0.0653 +/- 0.0015      1.6166 ✓
+/- 0.0005 ]
%          [  0.9147 +/- 0.0015        0.3026 +/- 0.0014      1.6196 ✓
+/- 0.0007 ]
%          [  0.9978 +/- 0.0013        0.3882 +/- 0.0012      1.6084 ✓
+/- 0.0007 ]
%          [  0.8182 +/- 0.0017        0.2006 +/- 0.0017      1.6262 ✓
+/- 0.0006 ]
%          [  0.6533 +/- 0.0020        0.0196 +/- 0.0020      1.6117 ✓
+/- 0.0006 ]
%          [  0.5457 +/- 0.0026      -0.0814 +/- 0.0026      1.5988 ✓
+/- 0.0006 ]
%          [  0.2965 +/- 0.0035      -0.3118 +/- 0.0036      1.5486 ✓
+/- 0.0006 ]
%          [  0.2310 +/- 0.0034      -0.3740 +/- 0.0033      1.5249 ✓
+/- 0.0007 ]
%          [  0.1407 +/- 0.0026      -0.4561 +/- 0.0025      1.4951 ✓
+/- 0.0007 ]
%          [ -0.0459 +/- 0.0021      -0.6072 +/- 0.0021      1.4366 ✓

```

+/- 0.0007 ]				
%	[	0.0607 +/- 0.0031	-0.5381 +/- 0.0030	1.4639 ✓
+/- 0.0009 ]				
%	[	0.1797 +/- 0.0036	-0.4304 +/- 0.0035	1.5054 ✓
+/- 0.0009 ]				
%	[	0.2913 +/- 0.0047	-0.3258 +/- 0.0046	1.5427 ✓
+/- 0.0009 ]				
%	[	0.3475 +/- 0.0041	-0.2664 +/- 0.0042	1.5575 ✓
+/- 0.0007 ]				
%	[	0.4768 +/- 0.0032	-0.1510 +/- 0.0032	1.5827 ✓
+/- 0.0006 ]				
%	[	0.6791 +/- 0.0026	0.0386 +/- 0.0027	1.6096 ✓
+/- 0.0007 ]				
%	[	0.7809 +/- 0.0022	0.1581 +/- 0.0023	1.6122 ✓
+/- 0.0007 ]				
%	[	0.6379 +/- 0.0029	0.0086 +/- 0.0029	1.6169 ✓
+/- 0.0007 ]				
%	[	0.4956 +/- 0.0037	-0.1348 +/- 0.0038	1.5880 ✓
+/- 0.0007 ]				
%	[	0.4802 +/- 0.0052	-0.1413 +/- 0.0053	1.5890 ✓
+/- 0.0008 ]				
%	[	0.3096 +/- 0.0065	-0.2999 +/- 0.0066	1.5566 ✓
+/- 0.0010 ]				
%	[	0.1897 +/- 0.0063	-0.4059 +/- 0.0062	1.5266 ✓
+/- 0.0012 ]				
%	[	0.0801 +/- 0.0048	-0.5114 +/- 0.0046	1.4884 ✓
+/- 0.0011 ]				
%	[	0.0564 +/- 0.0045	-0.5373 +/- 0.0044	1.4756 ✓
+/- 0.0012 ]				
%	[	0.1242 +/- 0.0064	-0.4698 +/- 0.0062	1.4958 ✓
+/- 0.0015 ]				
%	[	0.2459 +/- 0.0109	-0.3437 +/- 0.0107	1.5408 ✓
+/- 0.0021 ]				
%	[	0.3319 +/- 0.0120	-0.2572 +/- 0.0120	1.5634 ✓
+/- 0.0019 ]				
%	[	0.4172 +/- 0.0068	-0.1928 +/- 0.0069	1.5795 ✓
+/- 0.0010 ]				
%	[	0.5705 +/- 0.0042	-0.0533 +/- 0.0043	1.6018 ✓
+/- 0.0008 ]				
%	[	0.3091 +/- 0.0043	0.1728 +/- 0.0043	1.5698 ✓
+/- 0.0009 ]				
%	[	0.4352 +/- 0.0033	0.3027 +/- 0.0033	1.5619 ✓
+/- 0.0009 ]				
%	[	0.1431 +/- 0.0068	0.0109 +/- 0.0069	1.5813 ✓
+/- 0.0009 ]				
%	[	0.0197 +/- 0.0115	-0.0946 +/- 0.0114	1.5723 ✓
+/- 0.0008 ]				
%	[	-0.1009 +/- 0.0099	-0.2104 +/- 0.0099	1.5611 ✓
+/- 0.0009 ]				
%	[	-0.1594 +/- 0.0068	-0.2624 +/- 0.0068	1.5487 ✓
+/- 0.0009 ]				

%	[	-0.1974 +/- 0.0050	-0.3078 +/- 0.0049	1.5462 ✓
+/- 0.0007 ]				
%	[	0.0124 +/- 0.0062	-0.1264 +/- 0.0061	1.5750 ✓
+/- 0.0007 ]				
%	[	0.2357 +/- 0.0056	0.1024 +/- 0.0057	1.5806 ✓
+/- 0.0009 ]				
%	[	0.4099 +/- 0.0037	0.2861 +/- 0.0038	1.5655 ✓
+/- 0.0009 ]				
%	[	0.3029 +/- 0.0034	0.1718 +/- 0.0035	1.5784 ✓
+/- 0.0007 ]				
%	[	0.5177 +/- 0.0025	0.3830 +/- 0.0025	1.5519 ✓
+/- 0.0008 ]				
%	[	0.6074 +/- 0.0018	0.4824 +/- 0.0017	1.5367 ✓
+/- 0.0007 ]				
%	[	-0.3354 +/- 0.0015	-0.5289 +/- 0.0016	1.5158 ✓
+/- 0.0005 ]				
%	[	-0.1398 +/- 0.0019	-0.3456 +/- 0.0018	1.5676 ✓
+/- 0.0004 ]				
%	[	0.0910 +/- 0.0023	-0.1322 +/- 0.0023	1.6004 ✓
+/- 0.0004 ]				
%	[	0.1963 +/- 0.0027	-0.0161 +/- 0.0027	1.6131 ✓
+/- 0.0004 ]				
%	[	0.3018 +/- 0.0023	0.0887 +/- 0.0023	1.6191 ✓
+/- 0.0004 ]				
%	[	0.4960 +/- 0.0018	0.2837 +/- 0.0018	1.6104 ✓
+/- 0.0005 ]				
%	[	0.7023 +/- 0.0015	0.4942 +/- 0.0015	1.5790 ✓
+/- 0.0006 ]				
%	[	0.5726 +/- 0.0018	0.3567 +/- 0.0017	1.6011 ✓
+/- 0.0006 ]				
%	[	0.4565 +/- 0.0021	0.2319 +/- 0.0021	1.6131 ✓
+/- 0.0006 ]				
%	[	0.3409 +/- 0.0030	0.1143 +/- 0.0031	1.6172 ✓
+/- 0.0006 ]				
%	[	0.1842 +/- 0.0044	-0.0451 +/- 0.0044	1.6143 ✓
+/- 0.0005 ]				
%	[	0.1327 +/- 0.0057	-0.1023 +/- 0.0057	1.6072 ✓
+/- 0.0005 ]				
%	[	-0.0390 +/- 0.0050	-0.2586 +/- 0.0049	1.5842 ✓
+/- 0.0006 ]				
%	[	-0.1423 +/- 0.0033	-0.3540 +/- 0.0032	1.5677 ✓
+/- 0.0006 ]				
%	[	-0.2200 +/- 0.0025	-0.4275 +/- 0.0025	1.5493 ✓
+/- 0.0006 ]				
%	[	-0.3084 +/- 0.0022	-0.5037 +/- 0.0022	1.5297 ✓
+/- 0.0006 ]				
%	[	-0.2533 +/- 0.0032	-0.4636 +/- 0.0032	1.5394 ✓
+/- 0.0007 ]				
%	[	-0.1019 +/- 0.0043	-0.3262 +/- 0.0042	1.5754 ✓
+/- 0.0007 ]				
%	[	-0.0365 +/- 0.0060	-0.2583 +/- 0.0059	1.5895 ✓

+/- 0.0007 ]				
%	[	0.0153 +/- 0.0073	-0.2095 +/- 0.0072	1.5974 ✓
+/- 0.0006 ]				
%	[	0.1124 +/- 0.0060	-0.1192 +/- 0.0061	1.6094 ✓
+/- 0.0005 ]				
%	[	0.2134 +/- 0.0040	-0.0189 +/- 0.0040	1.6164 ✓
+/- 0.0005 ]				
%	[	0.2934 +/- 0.0031	0.0609 +/- 0.0031	1.6223 ✓
+/- 0.0006 ]				
%	[	0.4665 +/- 0.0026	0.2358 +/- 0.0026	1.6152 ✓
+/- 0.0006 ]				
%	[	0.6273 +/- 0.0023	0.4023 +/- 0.0023	1.5962 ✓
+/- 0.0007 ]				
%	[	0.5274 +/- 0.0029	0.3051 +/- 0.0029	1.6100 ✓
+/- 0.0008 ]				
%	[	0.3736 +/- 0.0036	0.1488 +/- 0.0036	1.6196 ✓
+/- 0.0007 ]				
%	[	0.1356 +/- 0.0050	-0.0990 +/- 0.0051	1.6147 ✓
+/- 0.0007 ]				
%	[	0.1171 +/- 0.0080	-0.1057 +/- 0.0081	1.6120 ✓
+/- 0.0006 ]				
%	[	0.0043 +/- 0.0090	-0.2215 +/- 0.0090	1.5979 ✓
+/- 0.0008 ]				
%	[	-0.0765 +/- 0.0065	-0.2955 +/- 0.0065	1.5832 ✓
+/- 0.0008 ]				
%	[	-0.1368 +/- 0.0045	-0.3545 +/- 0.0044	1.5672 ✓
+/- 0.0008 ]				
%	[	-0.2195 +/- 0.0036	-0.4357 +/- 0.0036	1.5505 ✓
+/- 0.0008 ]				
%	[	-0.1759 +/- 0.0047	-0.3992 +/- 0.0047	1.5574 ✓
+/- 0.0009 ]				
%	[	-0.0539 +/- 0.0060	-0.2816 +/- 0.0059	1.5822 ✓
+/- 0.0009 ]				
%	[	0.0601 +/- 0.0072	-0.1797 +/- 0.0071	1.5969 ✓
+/- 0.0010 ]				
%	[	0.0939 +/- 0.0105	-0.1445 +/- 0.0104	1.6039 ✓
+/- 0.0011 ]				
%	[	0.1496 +/- 0.0134	-0.0591 +/- 0.0135	1.6136 ✓
+/- 0.0009 ]				
%	[	0.2438 +/- 0.0078	0.0229 +/- 0.0079	1.6184 ✓
+/- 0.0007 ]				
%	[	0.3744 +/- 0.0051	0.1530 +/- 0.0051	1.6172 ✓
+/- 0.0008 ]				
%	[	0.4451 +/- 0.0038	0.2223 +/- 0.0038	1.6125 ✓
+/- 0.0008 ]				
%	[	0.5137 +/- 0.0033	0.2929 +/- 0.0033	1.6084 ✓
+/- 0.0008 ]				
%	[	0.5161 +/- 0.0040	0.2929 +/- 0.0040	1.6075 ✓
+/- 0.0009 ]				
%	[	0.2382 +/- 0.0047	0.0032 +/- 0.0047	1.6217 ✓
+/- 0.0009 ]				

% +/- 0.0008 ]	[	0.1958 +/- 0.0061	-0.0399 +/- 0.0061	1.6205 ✓
% +/- 0.0008 ]	[	0.1699 +/- 0.0091	-0.0587 +/- 0.0092	1.6166 ✓
% +/- 0.0009 ]	[	0.0961 +/- 0.0127	-0.1324 +/- 0.0128	1.6100 ✓
% +/- 0.0011 ]	[	0.0674 +/- 0.0158	-0.1603 +/- 0.0158	1.6048 ✓
% +/- 0.0013 ]	[	-0.0524 +/- 0.0124	-0.2689 +/- 0.0123	1.5860 ✓
% +/- 0.0011 ]	[	-0.0750 +/- 0.0084	-0.2981 +/- 0.0083	1.5813 ✓
% +/- 0.0011 ]	[	-0.1268 +/- 0.0064	-0.3412 +/- 0.0063	1.5701 ✓
% +/- 0.0012 ]	[	-0.1449 +/- 0.0063	-0.3816 +/- 0.0063	1.5609 ✓
% +/- 0.0013 ]	[	-0.0687 +/- 0.0083	-0.3144 +/- 0.0083	1.5762 ✓
% +/- 0.0015 ]	[	0.0621 +/- 0.0111	-0.2056 +/- 0.0110	1.5963 ✓
% +/- 0.0018 ]	[	0.1164 +/- 0.0170	-0.1494 +/- 0.0169	1.6039 ✓
% +/- 0.0011 ]	[	0.1591 +/- 0.0193	-0.0687 +/- 0.0194	1.6131 ✓
% +/- 0.0008 ]	[	0.2904 +/- 0.0090	0.0586 +/- 0.0090	1.6207 ✓
% +/- 0.0008 ]	[	0.3789 +/- 0.0056	0.1477 +/- 0.0057	1.6184 ✓
% +/- 0.0008 ]	[	0.4353 +/- 0.0045	0.1938 +/- 0.0045	1.6161 ✓
% +/- 0.0008 ]	[	0.4918 +/- 0.0037	0.2514 +/- 0.0037	1.6088 ✓
% +/- 0.0009 ]	[	0.4801 +/- 0.0043	0.2285 +/- 0.0043	1.6138 ✓
% +/- 0.0007 ]	[	0.5029 +/- 0.0033	0.2519 +/- 0.0033	1.6136 ✓
% +/- 0.0007 ]	[	0.3848 +/- 0.0040	0.1291 +/- 0.0040	1.6198 ✓
% +/- 0.0007 ]	[	0.2353 +/- 0.0053	-0.0063 +/- 0.0053	1.6186 ✓
% +/- 0.0008 ]	[	0.1275 +/- 0.0085	-0.1184 +/- 0.0086	1.6133 ✓
% +/- 0.0014 ]	[	0.0462 +/- 0.0184	-0.1782 +/- 0.0185	1.6059 ✓
% +/- 0.0011 ]	[	-0.0417 +/- 0.0095	-0.2665 +/- 0.0094	1.5910 ✓
% +/- 0.0010 ]	[	-0.1146 +/- 0.0056	-0.3576 +/- 0.0056	1.5723 ✓
% +/- 0.0009 ]	[	-0.0790 +/- 0.0039	-0.3381 +/- 0.0038	1.5745 ✓
%	[	-0.1547 +/- 0.0029	-0.4015 +/- 0.0029	1.5549 ✓

+/- 0.0007 ]				
%	[	-0.1488 +/- 0.0036	-0.3856 +/- 0.0036	1.5619 ✓
+/- 0.0007 ]				
%	[	-0.0463 +/- 0.0056	-0.2858 +/- 0.0055	1.5851 ✓
+/- 0.0008 ]				
%	[	0.0443 +/- 0.0100	-0.1978 +/- 0.0099	1.5987 ✓
+/- 0.0008 ]				
%	[	0.1291 +/- 0.0060	-0.1226 +/- 0.0061	1.6108 ✓
+/- 0.0005 ]				
%	[	0.2992 +/- 0.0035	0.0577 +/- 0.0035	1.6186 ✓
+/- 0.0005 ]				
%	[	0.4628 +/- 0.0027	0.2130 +/- 0.0026	1.6185 ✓
+/- 0.0006 ]				
%	[	0.6008 +/- 0.0023	0.3610 +/- 0.0022	1.6054 ✓
+/- 0.0006 ]				
%	[	0.4150 +/- 0.0026	0.1622 +/- 0.0026	1.6219 ✓
+/- 0.0005 ]				
%	[	0.1959 +/- 0.0034	-0.0534 +/- 0.0035	1.6192 ✓
+/- 0.0005 ]				
%	[	0.0463 +/- 0.0057	-0.2003 +/- 0.0058	1.6022 ✓
+/- 0.0006 ]				
%	[	-0.1207 +/- 0.0060	-0.3279 +/- 0.0059	1.5746 ✓
+/- 0.0008 ]				
%	[	-0.2592 +/- 0.0026	-0.4681 +/- 0.0026	1.5403 ✓
+/- 0.0006 ]				
%	[	-0.3584 +/- 0.0019	-0.5594 +/- 0.0019	1.5150 ✓
+/- 0.0006 ]				
%	[	-0.4877 +/- 0.0014	-0.6757 +/- 0.0014	1.4692 ✓
+/- 0.0006 ]				
%	[	-0.7963 +/- 0.0012	-0.9498 +/- 0.0012	1.3368 ✓
+/- 0.0006 ]				
%	[	-0.6853 +/- 0.0012	-0.8365 +/- 0.0012	1.4019 ✓
+/- 0.0006 ]				
%	[	-0.3629 +/- 0.0013	-0.5506 +/- 0.0013	1.5138 ✓
+/- 0.0004 ]				
%	[	-0.0687 +/- 0.0014	-0.2651 +/- 0.0013	1.5852 ✓
+/- 0.0002 ]				
%	[	0.0022 +/- 0.0025	-0.2185 +/- 0.0024	1.5949 ✓
+/- 0.0003 ]				
%	[	0.1891 +/- 0.0021	-0.0284 +/- 0.0021	1.6193 ✓
+/- 0.0003 ]				
%	[	0.2582 +/- 0.0013	0.0478 +/- 0.0012	1.6236 ✓
+/- 0.0003 ]				
%	[	0.5689 +/- 0.0013	0.3536 +/- 0.0011	1.6028 ✓
+/- 0.0005 ]				
%	[	0.8842 +/- 0.0012	0.6594 +/- 0.0011	1.5410 ✓
+/- 0.0006 ]				
%	[	0.9908 +/- 0.0013	0.7703 +/- 0.0012	1.5133 ✓
+/- 0.0007 ]				
%	[	1.0121 +/- 0.0012	0.7898 +/- 0.0011	1.4648 ✓
+/- 0.0006 ]				

% +/- 0.0004 ]	[ 0.6054 +/- 0.0013	0.3970 +/- 0.0012	1.5650 ✓
% +/- 0.0003 ]	[ 0.4612 +/- 0.0012	0.3174 +/- 0.0011	1.6015 ✓
% +/- 0.0002 ]	[ 0.1036 +/- 0.0018	-0.0376 +/- 0.0018	1.6140 ✓
% +/- 0.0003 ]	[ -0.1437 +/- 0.0018	-0.2682 +/- 0.0020	1.5876 ✓
% +/- 0.0005 ]	[ -0.4639 +/- 0.0014	-0.5606 +/- 0.0014	1.5178 ✓
% +/- 0.0006 ]	[ -0.6443 +/- 0.0013	-0.7251 +/- 0.0013	1.4605 ✓
% +/- 0.0006 ]	[ -0.7616 +/- 0.0012	-0.8402 +/- 0.0012	1.4121 ✓
% +/- 0.0006 ]	[ -0.5278 +/- 0.0014	-0.6310 +/- 0.0014	1.5002 ✓
% +/- 0.0005 ]	[ -0.2795 +/- 0.0018	-0.4077 +/- 0.0019	1.5594 ✓
% +/- 0.0005 ]	[ -0.1625 +/- 0.0030	-0.2811 +/- 0.0031	1.5800 ✓
% +/- 0.0005 ]	[ 0.0509 +/- 0.0075	-0.0781 +/- 0.0075	1.6054 ✓
% +/- 0.0004 ]	[ 0.1977 +/- 0.0026	0.0547 +/- 0.0026	1.6129 ✓
% +/- 0.0005 ]	[ 0.4729 +/- 0.0019	0.3196 +/- 0.0018	1.5972 ✓
% +/- 0.0005 ]	[ 0.5730 +/- 0.0016	0.4130 +/- 0.0016	1.5856 ✓
% +/- 0.0006 ]	[ 0.4953 +/- 0.0017	0.4965 +/- 0.0016	1.5478 ✓
% +/- 0.0006 ]	[ 0.4556 +/- 0.0020	0.4487 +/- 0.0019	1.5591 ✓
% +/- 0.0006 ]	[ 0.3262 +/- 0.0025	0.3290 +/- 0.0024	1.5824 ✓
% +/- 0.0006 ]	[ 0.1226 +/- 0.0042	0.1294 +/- 0.0042	1.6013 ✓
% +/- 0.0006 ]	[ -0.0097 +/- 0.0129	0.0071 +/- 0.0128	1.6032 ✓
% +/- 0.0006 ]	[ -0.2159 +/- 0.0058	-0.1736 +/- 0.0059	1.6000 ✓
% +/- 0.0006 ]	[ -0.3389 +/- 0.0032	-0.3341 +/- 0.0033	1.5650 ✓
% +/- 0.0006 ]	[ -0.4226 +/- 0.0025	-0.4029 +/- 0.0025	1.5568 ✓
% +/- 0.0006 ]	[ -0.4364 +/- 0.0020	-0.3813 +/- 0.0021	1.5729 ✓
% +/- 0.0007 ]	[ -0.3370 +/- 0.0031	-0.3190 +/- 0.0031	1.5767 ✓
% +/- 0.0007 ]	[ -0.2710 +/- 0.0042	-0.2419 +/- 0.0043	1.5893 ✓
%	[ -0.1448 +/- 0.0070	-0.1159 +/- 0.0071	1.6024 ✓



+/- 0.0006 ]	%	[	-0.0483 +/- 0.0209	-0.0337 +/- 0.0211	1.6011 ✓
+/- 0.0007 ]	%	[	0.0342 +/- 0.0068	0.0586 +/- 0.0068	1.6056 ✓
+/- 0.0007 ]	%	[	0.2880 +/- 0.0037	0.3095 +/- 0.0036	1.5801 ✓
+/- 0.0006 ]	%	[	0.3748 +/- 0.0027	0.3821 +/- 0.0027	1.5697 ✓
+/- 0.0007 ]	%	[	0.4381 +/- 0.0027	0.4447 +/- 0.0026	1.5572 ✓
+/- 0.0007 ]	%	[	0.3076 +/- 0.0031	0.3191 +/- 0.0031	1.5812 ✓
+/- 0.0008 ]	%	[	0.2191 +/- 0.0045	0.2290 +/- 0.0044	1.5956 ✓
+/- 0.0008 ]	%	[	0.1074 +/- 0.0077	0.1178 +/- 0.0076	1.6020 ✓
+/- 0.0008 ]	%	[	0.0171 +/- 0.0152	0.0353 +/- 0.0152	1.6049 ✓
+/- 0.0008 ]	%	[	-0.1128 +/- 0.0206	-0.0874 +/- 0.0207	1.6029 ✓
+/- 0.0011 ]	%	[	-0.2006 +/- 0.0074	-0.1864 +/- 0.0074	1.5949 ✓
+/- 0.0008 ]	%	[	-0.2870 +/- 0.0049	-0.2675 +/- 0.0049	1.5839 ✓
+/- 0.0008 ]	%	[	-0.2003 +/- 0.0070	-0.1921 +/- 0.0070	1.5920 ✓
+/- 0.0010 ]	%	[	-0.1071 +/- 0.0129	-0.1028 +/- 0.0129	1.6040 ✓
+/- 0.0010 ]	%	[	-0.0054 +/- 0.0300	-0.0243 +/- 0.0300	1.6039 ✓
+/- 0.0010 ]	%	[	0.1313 +/- 0.0146	0.1678 +/- 0.0145	1.6041 ✓
+/- 0.0011 ]	%	[	0.2338 +/- 0.0086	0.2525 +/- 0.0085	1.5925 ✓
+/- 0.0011 ]	%	[	0.2867 +/- 0.0056	0.2998 +/- 0.0056	1.5853 ✓
+/- 0.0010 ]	%	[	0.3282 +/- 0.0042	0.3389 +/- 0.0041	1.5770 ✓
+/- 0.0010 ]	%	[	0.3502 +/- 0.0042	0.3406 +/- 0.0041	1.5389 ✓
+/- 0.0009 ]	%	[	0.3516 +/- 0.0042	0.3405 +/- 0.0041	1.5378 ✓
+/- 0.0009 ]	%	[	0.2665 +/- 0.0056	0.2761 +/- 0.0056	1.5533 ✓
+/- 0.0010 ]	%	[	0.1854 +/- 0.0074	0.2001 +/- 0.0073	1.5632 ✓
+/- 0.0009 ]	%	[	0.0223 +/- 0.0095	0.0340 +/- 0.0095	1.5746 ✓
+/- 0.0012 ]	%	[	0.0513 +/- 0.0146	0.0852 +/- 0.0145	1.5707 ✓
+/- 0.0009 ]					

% +/- 0.0011 ]	[ -0.0296 +/- 0.0252	-0.0090 +/- 0.0252	1.5696 ✓
% +/- 0.0011 ]	[ -0.1512 +/- 0.0123	-0.1258 +/- 0.0125	1.5657 ✓
% +/- 0.0010 ]	[ -0.2772 +/- 0.0065	-0.2391 +/- 0.0066	1.5525 ✓
% +/- 0.0010 ]	[ -0.3401 +/- 0.0051	-0.2959 +/- 0.0052	1.5412 ✓
% +/- 0.0009 ]	[ -0.1464 +/- 0.0083	-0.1229 +/- 0.0084	1.5648 ✓
% +/- 0.0009 ]	[ -0.0361 +/- 0.0161	-0.0342 +/- 0.0162	1.5678 ✓
% +/- 0.0008 ]	[ 0.0432 +/- 0.0095	0.0507 +/- 0.0093	1.5698 ✓
% +/- 0.0007 ]	[ 0.2017 +/- 0.0050	0.2042 +/- 0.0049	1.5604 ✓
% +/- 0.0007 ]	[ 0.3484 +/- 0.0036	0.3420 +/- 0.0036	1.5422 ✓
% +/- 0.0008 ]	[ 0.4806 +/- 0.0031	0.4700 +/- 0.0030	1.5154 ✓
% +/- 0.0007 ]	[ 0.4020 +/- 0.0028	0.3953 +/- 0.0027	1.5243 ✓
% +/- 0.0007 ]	[ 0.5140 +/- 0.0026	0.5014 +/- 0.0026	1.5097 ✓
% +/- 0.0006 ]	[ 0.1902 +/- 0.0036	0.1802 +/- 0.0036	1.5632 ✓
% +/- 0.0007 ]	[ 0.0579 +/- 0.0065	0.0457 +/- 0.0063	1.5703 ✓
% +/- 0.0008 ]	[ -0.0172 +/- 0.0116	-0.0309 +/- 0.0117	1.5677 ✓
% +/- 0.0008 ]	[ -0.1487 +/- 0.0058	-0.1437 +/- 0.0059	1.5603 ✓
% +/- 0.0008 ]	[ -0.3569 +/- 0.0035	-0.3377 +/- 0.0036	1.5348 ✓
% +/- 0.0006 ]	[ -0.3419 +/- 0.0024	-0.3165 +/- 0.0024	1.5387 ✓
% +/- 0.0006 ]	[ -0.1536 +/- 0.0032	-0.1489 +/- 0.0034	1.5567 ✓
% +/- 0.0005 ]	[ 0.0220 +/- 0.0053	-0.0105 +/- 0.0053	1.5625 ✓
% +/- 0.0004 ]	[ 0.3166 +/- 0.0027	0.3120 +/- 0.0026	1.5475 ✓
% +/- 0.0005 ]	[ 0.4671 +/- 0.0018	0.4449 +/- 0.0017	1.5229 ✓
% +/- 0.0005 ]	[ 0.6133 +/- 0.0016	0.5832 +/- 0.0016	1.4895 ✓
% +/- 0.0005 ]	[ 0.7357 +/- 0.0013	0.6929 +/- 0.0012	1.4564 ✓
% +/- 0.0003 ]	[ 0.3115 +/- 0.0016	0.2883 +/- 0.0015	1.5491 ✓
%	[ -0.0876 +/- 0.0020	-0.0982 +/- 0.0023	1.5591 ✓

+/- 0.0003 ]				
%	[	-0.4404 +/- 0.0014	-0.4101 +/- 0.0015	1.5190 ✓
+/- 0.0005 ]				
%	[	-0.6211 +/- 0.0013	-0.5820 +/- 0.0014	1.4726 ✓
+/- 0.0006 ]				
%	[	-0.8624 +/- 0.0013	-0.6648 +/- 0.0012	1.5288 ✓
+/- 0.0007 ]				
%	[	-0.4802 +/- 0.0015	-0.2871 +/- 0.0016	1.6072 ✓
+/- 0.0005 ]				
%	[	-0.2284 +/- 0.0024	-0.0367 +/- 0.0026	1.6195 ✓
+/- 0.0004 ]				
%	[	0.0960 +/- 0.0024	0.2893 +/- 0.0023	1.5971 ✓
+/- 0.0004 ]				
%	[	0.4392 +/- 0.0016	0.6327 +/- 0.0016	1.4998 ✓
+/- 0.0005 ]				
%	[	0.5939 +/- 0.0015	0.7689 +/- 0.0015	1.4662 ✓
+/- 0.0006 ]				
%	[	0.3985 +/- 0.0019	0.5655 +/- 0.0018	1.5401 ✓
+/- 0.0006 ]				
%	[	0.1426 +/- 0.0026	0.3061 +/- 0.0025	1.6006 ✓
+/- 0.0006 ]				
%	[	-0.0034 +/- 0.0043	0.1683 +/- 0.0042	1.6196 ✓
+/- 0.0006 ]				
%	[	-0.1630 +/- 0.0062	0.0154 +/- 0.0063	1.6246 ✓
+/- 0.0007 ]				
%	[	-0.3369 +/- 0.0037	-0.1609 +/- 0.0038	1.6281 ✓
+/- 0.0006 ]				
%	[	-0.5436 +/- 0.0028	-0.3557 +/- 0.0029	1.6022 ✓
+/- 0.0007 ]				
%	[	-0.4578 +/- 0.0035	-0.2862 +/- 0.0036	1.6108 ✓
+/- 0.0008 ]				
%	[	-0.2021 +/- 0.0054	-0.0237 +/- 0.0056	1.6408 ✓
+/- 0.0007 ]				
%	[	-0.1664 +/- 0.0098	0.0131 +/- 0.0099	1.6244 ✓
+/- 0.0008 ]				
%	[	-0.0403 +/- 0.0090	0.1434 +/- 0.0088	1.6180 ✓
+/- 0.0009 ]				
%	[	0.0466 +/- 0.0056	0.2414 +/- 0.0054	1.5940 ✓
+/- 0.0009 ]				
%	[	0.2366 +/- 0.0039	0.4247 +/- 0.0038	1.5716 ✓
+/- 0.0009 ]				
%	[	0.3814 +/- 0.0034	0.5674 +/- 0.0033	1.5303 ✓
+/- 0.0009 ]				
%	[	0.2316 +/- 0.0040	0.4217 +/- 0.0039	1.5699 ✓
+/- 0.0010 ]				
%	[	0.0744 +/- 0.0063	0.2684 +/- 0.0062	1.6019 ✓
+/- 0.0011 ]				
%	[	-0.0930 +/- 0.0121	0.1027 +/- 0.0119	1.6235 ✓
+/- 0.0013 ]				
%	[	-0.2139 +/- 0.0145	-0.0109 +/- 0.0146	1.6253 ✓
+/- 0.0013 ]				

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%          [  -0.2176 +/- 0.0079      -0.0353 +/- 0.0080      1.6210 ✓
+/- 0.0008 ]
%          [  -0.4636 +/- 0.0059      -0.2612 +/- 0.0060      1.6085 ✓
+/- 0.0011 ]
%          [  -0.2115 +/- 0.0018       0.1217 +/- 0.0019      1.6413 ✓
+/- 0.0004 ]
%          [   0.1162 +/- 0.0017       0.4566 +/- 0.0016      1.5854 ✓
+/- 0.0004 ]
%          [   0.3531 +/- 0.0015       0.6913 +/- 0.0014      1.5092 ✓
+/- 0.0005 ]
%          [   0.4327 +/- 0.0016       0.7650 +/- 0.0015      1.4793 ✓
+/- 0.0006 ]
%          [   0.2873 +/- 0.0020       0.6263 +/- 0.0019      1.5332 ✓
+/- 0.0007 ]
%          [   0.2517 +/- 0.0025       0.6028 +/- 0.0024      1.5359 ✓
+/- 0.0008 ]
%          [   0.0909 +/- 0.0033       0.4465 +/- 0.0031      1.5856 ✓
+/- 0.0008 ]
%          [  -0.0399 +/- 0.0044       0.3125 +/- 0.0042      1.6144 ✓
+/- 0.0007 ]
%          [  -0.2605 +/- 0.0054       0.0881 +/- 0.0054      1.6452 ✓
+/- 0.0009 ]
%          [  -0.3958 +/- 0.0047      -0.0537 +/- 0.0048      1.6543 ✓
+/- 0.0008 ]
%          [  -0.4526 +/- 0.0038      -0.1242 +/- 0.0039      1.6506 ✓
+/- 0.0007 ]
%          [  -0.2848 +/- 0.0050      -0.2006 +/- 0.0051      1.6288 ✓
+/- 0.0010 ]
%          [  -0.1262 +/- 0.0074      -0.0522 +/- 0.0076      1.6369 ✓
+/- 0.0009 ]
%          [  -0.0150 +/- 0.0096       0.0712 +/- 0.0096      1.6355 ✓
+/- 0.0008 ]
%          [   0.0766 +/- 0.0062       0.1688 +/- 0.0061      1.6337 ✓
+/- 0.0009 ]
%          [   0.2283 +/- 0.0048       0.3205 +/- 0.0047      1.6116 ✓
+/- 0.0009 ]
%          [   0.3992 +/- 0.0039       0.4986 +/- 0.0038      1.5744 ✓
+/- 0.0009 ]
%
% Translation vectors (mm):
%          [ 105.4932 +/- 0.9537       29.9236 +/- 0.8501      867.2133 ✓
+/- 0.9228 ]
%          [ 228.1690 +/- 1.0481      -15.1420 +/- 0.9279      942.8685 ✓
+/- 1.0731 ]
%          [ 182.8844 +/- 1.0712      -25.9964 +/- 0.9472      966.1927 ✓
+/- 1.1514 ]
%          [  78.0911 +/- 1.0477      -13.2111 +/- 0.9273      951.0616 ✓
+/- 1.1713 ]
%          [   5.4699 +/- 1.0187       0.4742 +/- 0.8988      923.2810 ✓
+/- 1.1138 ]
%          [   1.2913 +/- 1.0057       4.2316 +/- 0.8872      911.3908 ✓
+/- 1.1138 ]

```

+/- 1.0656 ]				
%	[	64.9611 +/- 1.0312	-5.0681 +/- 0.9100	934.3170 ✓
+/- 1.0862 ]				
%	[	37.9619 +/- 0.8760	64.8978 +/- 0.7763	792.5719 ✓
+/- 0.9115 ]				
%	[	63.6857 +/- 1.3026	-90.1251 +/- 1.1508	1179.8170 ✓
+/- 1.4178 ]				
%	[	14.0743 +/- 1.3743	-127.2892 +/- 1.2172	1243.5398 ✓
+/- 1.5278 ]				
%	[	59.4498 +/- 1.4918	-168.4101 +/- 1.3277	1349.4707 ✓
+/- 1.7401 ]				
%	[	-45.6408 +/- 1.5911	-198.4937 +/- 1.4198	1432.9105 ✓
+/- 1.9800 ]				
%	[	137.7905 +/- 1.5987	-208.3511 +/- 1.4261	1441.7556 ✓
+/- 1.9312 ]				
%	[	209.0043 +/- 1.5552	-191.5545 +/- 1.3776	1396.7359 ✓
+/- 1.7438 ]				
%	[	95.3629 +/- 1.5139	-164.9136 +/- 1.3385	1369.5060 ✓
+/- 1.6193 ]				
%	[	163.3644 +/- 1.9281	-336.1570 +/- 1.7191	1731.3994 ✓
+/- 2.2290 ]				
%	[	216.5774 +/- 1.8903	-317.7654 +/- 1.6874	1691.8902 ✓
+/- 2.2685 ]				
%	[	144.0583 +/- 1.8565	-305.6393 +/- 1.6760	1670.0347 ✓
+/- 2.4428 ]				
%	[	-46.5045 +/- 1.8006	-269.1989 +/- 1.6194	1619.7529 ✓
+/- 2.3248 ]				
%	[	-55.1791 +/- 1.7730	-257.6049 +/- 1.5867	1595.5757 ✓
+/- 2.1576 ]				
%	[	63.8637 +/- 1.8273	-290.2750 +/- 1.6369	1647.8672 ✓
+/- 2.1698 ]				
%	[	136.5087 +/- 1.7178	-225.5181 +/- 1.5273	1549.5221 ✓
+/- 1.9886 ]				
%	[	-81.2913 +/- 2.1137	-372.3954 +/- 1.9017	1898.1823 ✓
+/- 2.5981 ]				
%	[	-141.4767 +/- 2.1594	-418.3839 +/- 1.9537	1928.8900 ✓
+/- 2.7355 ]				
%	[	83.5868 +/- 2.1827	-465.7845 +/- 2.0093	1959.5769 ✓
+/- 2.9342 ]				
%	[	-96.3044 +/- 2.1579	-446.0951 +/- 1.9883	1925.7336 ✓
+/- 3.0480 ]				
%	[	-11.4906 +/- 2.1174	-432.7909 +/- 1.9340	1900.3647 ✓
+/- 2.8847 ]				
%	[	-49.6643 +/- 2.1016	-429.5092 +/- 1.8922	1884.8275 ✓
+/- 2.6107 ]				
%	[	-1.0042 +/- 2.2497	-489.9543 +/- 2.0320	2017.6170 ✓
+/- 2.7766 ]				
%	[	57.5223 +/- 2.6349	-623.5479 +/- 2.4205	2358.1466 ✓
+/- 3.5542 ]				
%	[	117.3987 +/- 2.7351	-672.6700 +/- 2.5987	2443.5442 ✓
+/- 4.2665 ]				

%	[	56.4691 +/- 2.7507	-670.1537 +/- 2.6777	2461.8343 ✓
+/- 4.6373 ]				
%	[	-62.9183 +/- 2.6072	-605.6328 +/- 2.4398	2329.8466 ✓
+/- 3.7686 ]				
%	[	-39.0394 +/- 2.4964	-566.9999 +/- 2.2974	2234.9370 ✓
+/- 3.3102 ]				
%	[	-67.7652 +/- 2.5594	170.7337 +/- 2.2708	2316.8406 ✓
+/- 3.4594 ]				
%	[	109.5856 +/- 2.2749	193.6511 +/- 2.0234	2054.9147 ✓
+/- 2.8649 ]				
%	[	-156.8249 +/- 2.7243	168.6375 +/- 2.4024	2456.5150 ✓
+/- 4.0955 ]				
%	[	-73.0458 +/- 2.8919	154.4742 +/- 2.5475	2612.3783 ✓
+/- 5.0128 ]				
%	[	-181.1767 +/- 2.9297	149.9421 +/- 2.5692	2626.0334 ✓
+/- 4.5654 ]				
%	[	-78.4250 +/- 2.7943	163.1256 +/- 2.4743	2524.2257 ✓
+/- 3.8815 ]				
%	[	-85.5142 +/- 2.3899	185.9408 +/- 2.1199	2155.9950 ✓
+/- 3.0346 ]				
%	[	36.8179 +/- 2.1955	193.7068 +/- 1.9454	1988.5202 ✓
+/- 3.1376 ]				
%	[	328.0013 +/- 2.0929	204.0918 +/- 1.8233	1846.5378 ✓
+/- 2.8738 ]				
%	[	382.6009 +/- 1.9132	218.3817 +/- 1.6719	1667.7805 ✓
+/- 2.3163 ]				
%	[	86.4009 +/- 1.8908	219.3988 +/- 1.6846	1705.7930 ✓
+/- 2.3324 ]				
%	[	218.9209 +/- 1.7517	224.6825 +/- 1.5609	1563.8076 ✓
+/- 2.0047 ]				
%	[	155.2869 +/- 1.3517	265.1476 +/- 1.2290	1202.4203 ✓
+/- 1.4474 ]				
%	[	38.1777 +/- 0.9894	50.0229 +/- 0.8802	898.4404 ✓
+/- 0.9214 ]				
%	[	73.4326 +/- 0.9841	54.5203 +/- 0.8748	894.9046 ✓
+/- 0.9787 ]				
%	[	175.1102 +/- 1.0042	51.5908 +/- 0.8873	906.1590 ✓
+/- 1.0904 ]				
%	[	87.5894 +/- 1.0657	49.8202 +/- 0.9405	964.4724 ✓
+/- 1.1993 ]				
%	[	49.4566 +/- 1.0810	44.0854 +/- 0.9562	979.3273 ✓
+/- 1.1562 ]				
%	[	47.3144 +/- 1.0891	41.3435 +/- 0.9646	986.7822 ✓
+/- 1.1196 ]				
%	[	84.3510 +/- 1.0313	51.6727 +/- 0.9148	932.9394 ✓
+/- 1.0466 ]				
%	[	-12.1966 +/- 1.3075	11.2618 +/- 1.1545	1185.0351 ✓
+/- 1.3698 ]				
%	[	-51.4447 +/- 1.4487	-12.3019 +/- 1.2769	1311.4675 ✓
+/- 1.5573 ]				
%	[	-7.7067 +/- 1.5840	-36.4513 +/- 1.3973	1435.4653 ✓

+/- 1.7885 ]	%	[ -52.1589 +/- 1.5850	-35.7220 +/- 1.3969	1433.6293 ✓
+/- 1.9133 ]	%	[ 77.6052 +/- 1.5881	-33.2217 +/- 1.4039	1440.3197 ✓
+/- 2.0724 ]	%	[ -26.9257 +/- 1.6124	-35.9208 +/- 1.4194	1458.8884 ✓
+/- 1.9127 ]	%	[ 10.9484 +/- 1.5577	-26.5872 +/- 1.3735	1412.2840 ✓
+/- 1.6647 ]	%	[ 46.1341 +/- 1.5317	-24.0878 +/- 1.3522	1389.9592 ✓
+/- 1.5764 ]	%	[ 10.6063 +/- 1.5075	-15.3293 +/- 1.3301	1367.0522 ✓
+/- 1.5160 ]	%	[ -58.6295 +/- 1.8810	-78.4825 +/- 1.6540	1701.3989 ✓
+/- 2.0274 ]	%	[ 47.1166 +/- 1.9057	-82.4746 +/- 1.6811	1728.1724 ✓
+/- 2.1618 ]	%	[ -2.4965 +/- 1.8833	-75.4923 +/- 1.6606	1706.0185 ✓
+/- 2.2968 ]	%	[ -103.9479 +/- 1.7942	-62.2068 +/- 1.5735	1612.3020 ✓
+/- 2.4110 ]	%	[ -105.1244 +/- 1.7599	-60.5239 +/- 1.5476	1584.9368 ✓
+/- 2.2876 ]	%	[ -120.8277 +/- 1.7128	-54.9854 +/- 1.5062	1544.1570 ✓
+/- 2.0265 ]	%	[ -157.5671 +/- 1.7275	-56.5365 +/- 1.5170	1554.9515 ✓
+/- 1.9675 ]	%	[ 32.3433 +/- 1.6941	-55.3860 +/- 1.4943	1535.5854 ✓
+/- 1.9052 ]	%	[ 206.3782 +/- 1.6799	-49.4064 +/- 1.4778	1514.2522 ✓
+/- 1.8682 ]	%	[ 105.0965 +/- 2.0083	-88.1785 +/- 1.7707	1818.5075 ✓
+/- 2.3657 ]	%	[ -26.4974 +/- 2.0539	-96.2629 +/- 1.8119	1860.3370 ✓
+/- 2.4768 ]	%	[ -317.9871 +/- 2.0568	-93.5519 +/- 1.7887	1822.6872 ✓
+/- 2.5494 ]	%	[ -75.2520 +/- 2.0059	-88.8226 +/- 1.7703	1811.1014 ✓
+/- 2.8170 ]	%	[ -122.1069 +/- 2.0289	-93.0945 +/- 1.7798	1821.0112 ✓
+/- 2.8589 ]	%	[ -99.5026 +/- 1.9848	-91.7432 +/- 1.7417	1788.3834 ✓
+/- 2.4351 ]	%	[ -15.6344 +/- 2.0072	-95.9266 +/- 1.7678	1817.7683 ✓
+/- 2.2898 ]	%	[ -50.8227 +/- 2.0027	-99.0605 +/- 1.7617	1811.9241 ✓
+/- 2.2173 ]	%	[ -45.4571 +/- 2.3415	-149.2578 +/- 2.0617	2118.5837 ✓
+/- 2.7675 ]	%	[ 98.6072 +/- 2.3227	-136.9025 +/- 2.0508	2104.9870 ✓
+/- 2.8537 ]				

%	[	259.9561 +/- 2.3129	-128.6490 +/- 2.0385	2084.1288 ✓
+/- 2.9772 ]				
%	[	171.2680 +/- 2.3621	-144.5954 +/- 2.0924	2136.1715 ✓
+/- 3.4321 ]				
%	[	125.8751 +/- 2.3684	-131.9969 +/- 2.1022	2142.8321 ✓
+/- 3.8738 ]				
%	[	80.5982 +/- 2.3350	-128.8891 +/- 2.0659	2114.6788 ✓
+/- 3.2713 ]				
%	[	161.5710 +/- 2.2813	-129.6730 +/- 2.0114	2061.3269 ✓
+/- 2.9249 ]				
%	[	105.4664 +/- 2.2379	-116.5956 +/- 1.9742	2026.0104 ✓
+/- 2.7745 ]				
%	[	130.9451 +/- 2.2276	-113.8412 +/- 1.9639	2015.5623 ✓
+/- 2.7274 ]				
%	[	234.1290 +/- 2.5616	-159.6008 +/- 2.2542	2308.1265 ✓
+/- 3.3218 ]				
%	[	-399.4601 +/- 2.5883	-161.3512 +/- 2.2514	2292.3164 ✓
+/- 3.3532 ]				
%	[	-313.2018 +/- 2.6101	-167.6790 +/- 2.2838	2327.4237 ✓
+/- 3.5243 ]				
%	[	-141.0482 +/- 2.6417	-174.3813 +/- 2.3352	2381.2534 ✓
+/- 3.8943 ]				
%	[	-184.9002 +/- 2.6788	-175.2890 +/- 2.3638	2400.7743 ✓
+/- 4.3341 ]				
%	[	-53.4274 +/- 2.6760	-175.0006 +/- 2.3783	2417.1619 ✓
+/- 4.6256 ]				
%	[	-197.2030 +/- 2.6838	-178.0960 +/- 2.3492	2401.4966 ✓
+/- 3.9104 ]				
%	[	-77.1072 +/- 2.6463	-177.0652 +/- 2.3310	2390.9274 ✓
+/- 3.5034 ]				
%	[	-37.0766 +/- 2.6507	-168.6800 +/- 2.3360	2398.9619 ✓
+/- 3.3604 ]				
%	[	-87.2204 +/- 2.6431	-340.8100 +/- 2.3403	2383.3388 ✓
+/- 3.1968 ]				
%	[	-30.3582 +/- 2.6646	-345.2493 +/- 2.3639	2405.3071 ✓
+/- 3.2976 ]				
%	[	181.1796 +/- 2.6063	-335.3305 +/- 2.3201	2349.6775 ✓
+/- 3.3962 ]				
%	[	187.0015 +/- 2.5773	-329.5723 +/- 2.3106	2321.8031 ✓
+/- 3.8131 ]				
%	[	34.6390 +/- 2.5975	-328.4773 +/- 2.3462	2346.3957 ✓
+/- 4.2687 ]				
%	[	158.0740 +/- 2.5541	-321.4187 +/- 2.2758	2302.1374 ✓
+/- 3.4898 ]				
%	[	160.9423 +/- 2.4430	-289.0522 +/- 2.1683	2203.1850 ✓
+/- 3.1352 ]				
%	[	105.2112 +/- 2.4614	-301.9001 +/- 2.1874	2222.5474 ✓
+/- 3.1198 ]				
%	[	64.6330 +/- 2.4251	-289.9179 +/- 2.1536	2191.3703 ✓
+/- 3.0291 ]				
%	[	86.9576 +/- 2.7235	-351.2181 +/- 2.4272	2458.9585 ✓



+/- 3.5911 ]				
%	[	45.9357 +/- 2.1943	-272.0435 +/- 1.9475	1982.5732 ✓
+/- 2.6305 ]				
%	[	-42.6534 +/- 2.1710	-274.0999 +/- 1.9272	1959.6879 ✓
+/- 2.6139 ]				
%	[	-148.7267 +/- 2.1118	-242.2431 +/- 1.8688	1899.0921 ✓
+/- 2.5806 ]				
%	[	-182.5837 +/- 2.0791	-240.1937 +/- 1.8422	1860.9587 ✓
+/- 2.7329 ]				
%	[	-124.6405 +/- 2.1059	-244.2139 +/- 1.8839	1882.7468 ✓
+/- 3.4190 ]				
%	[	-66.8288 +/- 2.0830	-240.1713 +/- 1.8397	1877.9040 ✓
+/- 2.4992 ]				
%	[	-56.2303 +/- 2.0593	-259.7701 +/- 1.8177	1857.5123 ✓
+/- 2.2883 ]				
%	[	223.0396 +/- 2.0417	-256.6157 +/- 1.8050	1838.0117 ✓
+/- 2.2396 ]				
%	[	171.3914 +/- 1.7550	-210.3883 +/- 1.5503	1583.6523 ✓
+/- 1.8274 ]				
%	[	18.4100 +/- 1.6842	-195.5347 +/- 1.4854	1522.5911 ✓
+/- 1.7488 ]				
%	[	9.0167 +/- 1.6447	-187.8741 +/- 1.4526	1486.7027 ✓
+/- 1.7969 ]				
%	[	-19.9510 +/- 1.6049	-186.4284 +/- 1.4294	1447.8545 ✓
+/- 2.1199 ]				
%	[	-125.8152 +/- 1.5745	-176.2929 +/- 1.3923	1411.6235 ✓
+/- 1.8873 ]				
%	[	-47.2568 +/- 1.5856	-174.7782 +/- 1.4011	1431.2087 ✓
+/- 1.7555 ]				
%	[	9.3686 +/- 1.6440	-192.6456 +/- 1.4537	1485.7981 ✓
+/- 1.8014 ]				
%	[	104.0302 +/- 1.6242	-182.3283 +/- 1.4353	1467.6647 ✓
+/- 1.7703 ]				
%	[	-32.1023 +/- 1.5384	-178.1516 +/- 1.3588	1389.0758 ✓
+/- 1.6594 ]				
%	[	-197.4278 +/- 1.5049	-162.8355 +/- 1.3211	1343.2617 ✓
+/- 1.6391 ]				
%	[	-201.2303 +/- 1.4287	-145.9797 +/- 1.2509	1265.0183 ✓
+/- 1.6842 ]				
%	[	-156.5391 +/- 1.4000	-139.4791 +/- 1.2182	1246.0109 ✓
+/- 1.5280 ]				
%	[	-72.9225 +/- 1.3472	-134.0547 +/- 1.1809	1214.1532 ✓
+/- 1.3093 ]				
%	[	-2.4260 +/- 1.3120	-122.4011 +/- 1.1537	1187.0654 ✓
+/- 1.2516 ]				
%	[	26.2757 +/- 0.9882	-76.5195 +/- 0.8698	895.8895 ✓
+/- 0.8866 ]				
%	[	-24.3321 +/- 0.6662	-28.1207 +/- 0.5885	604.1637 ✓
+/- 0.5393 ]				
%	[	-34.0155 +/- 0.6732	-22.3235 +/- 0.5939	609.3816 ✓
+/- 0.5506 ]				

%	[	35.1238 +/- 0.6019	-21.5810 +/- 0.5331	548.2701 ✓
+/- 0.5208 ]				
%	[	46.5831 +/- 0.5072	-6.5881 +/- 0.4500	463.1810 ✓
+/- 0.4940 ]				
%	[	94.7750 +/- 0.8722	-60.0281 +/- 0.7731	792.1719 ✓
+/- 0.8920 ]				
%	[	-29.3389 +/- 0.8164	-51.6312 +/- 0.7191	736.9386 ✓
+/- 0.8228 ]				
%	[	-33.7287 +/- 0.5170	-8.8533 +/- 0.4556	465.7480 ✓
+/- 0.4937 ]				
%	[	9.7548 +/- 0.5077	-10.7522 +/- 0.4489	460.1579 ✓
+/- 0.4931 ]				
%	[	56.1850 +/- 0.4870	-12.3014 +/- 0.4309	441.1879 ✓
+/- 0.4886 ]				
%	[	96.8076 +/- 0.6122	-29.4707 +/- 0.5398	552.7919 ✓
+/- 0.6161 ]				
%	[	95.0266 +/- 0.5574	-172.7328 +/- 0.4914	493.2002 ✓
+/- 0.5674 ]				
%	[	-19.9119 +/- 0.5910	-168.7371 +/- 0.5170	524.7466 ✓
+/- 0.5737 ]				
%	[	-1.1225 +/- 0.4026	-128.4307 +/- 0.3476	355.6555 ✓
+/- 0.3851 ]				
%	[	-33.7333 +/- 0.5907	-142.4863 +/- 0.5160	526.2132 ✓
+/- 0.5477 ]				
%	[	40.5168 +/- 0.6468	-146.5892 +/- 0.5686	583.0691 ✓
+/- 0.5901 ]				
%	[	-19.8869 +/- 0.7147	-148.3701 +/- 0.6225	640.6720 ✓
+/- 0.6083 ]				
%	[	-14.3412 +/- 0.7196	-143.8618 +/- 0.6276	646.1500 ✓
+/- 0.6000 ]				
%	[	-24.6317 +/- 0.6470	-140.2300 +/- 0.5624	579.5266 ✓
+/- 0.5247 ]				
%	[	40.7543 +/- 0.9806	-169.6082 +/- 0.8623	884.2732 ✓
+/- 0.8687 ]				
%	[	91.2315 +/- 1.0586	-184.7850 +/- 0.9341	954.8134 ✓
+/- 0.9728 ]				
%	[	17.4841 +/- 1.0728	-179.9369 +/- 0.9444	967.5400 ✓
+/- 0.9978 ]				
%	[	36.8191 +/- 1.0587	-178.3847 +/- 0.9382	954.6675 ✓
+/- 1.1582 ]				
%	[	-80.7642 +/- 1.0981	-188.2592 +/- 0.9653	984.2599 ✓
+/- 1.0871 ]				
%	[	16.9283 +/- 1.1201	-199.9654 +/- 0.9890	1008.2769 ✓
+/- 1.1180 ]				
%	[	-32.3094 +/- 1.1767	-209.0355 +/- 1.0385	1057.9696 ✓
+/- 1.1839 ]				
%	[	-27.5378 +/- 1.1965	-93.1848 +/- 1.0522	1082.4271 ✓
+/- 1.1980 ]				
%	[	-41.0969 +/- 1.4821	-99.8098 +/- 1.3041	1340.9507 ✓
+/- 1.5451 ]				
%	[	-14.0330 +/- 1.4989	-97.0301 +/- 1.3196	1357.1974 ✓

+/- 1.5681 ]	%	[ -68.3078 +/- 1.5744	-96.0876 +/- 1.3847	1423.5350 ✓
+/- 1.6920 ]	%	[ -1.3887 +/- 1.5472	-94.0319 +/- 1.3633	1402.2731 ✓
+/- 1.9130 ]	%	[ -51.9909 +/- 1.5676	-71.9511 +/- 1.3773	1417.5080 ✓
+/- 1.5395 ]	%	[ -76.7355 +/- 1.5631	-120.1472 +/- 1.3728	1411.3446 ✓
+/- 1.5169 ]	%	[ -48.8597 +/- 1.5325	-107.2258 +/- 1.3472	1385.7654 ✓
+/- 1.4791 ]	%	[ 71.8803 +/- 1.4291	-63.9178 +/- 1.2602	1296.1229 ✓
+/- 1.3636 ]	%	[ 56.9336 +/- 1.8589	-95.8957 +/- 1.6385	1685.0546 ✓
+/- 1.9115 ]	%	[ 11.5763 +/- 1.8807	-80.2720 +/- 1.6568	1704.4714 ✓
+/- 1.9363 ]	%	[ 59.3347 +/- 1.8230	-69.7376 +/- 1.6071	1653.2855 ✓
+/- 1.8804 ]	%	[ -13.3798 +/- 1.7841	-84.7637 +/- 1.5713	1616.8421 ✓
+/- 2.4249 ]	%	[ -102.3609 +/- 1.7508	-75.3063 +/- 1.5397	1582.2559 ✓
+/- 2.0023 ]	%	[ 130.9209 +/- 1.7475	-84.3192 +/- 1.5398	1581.7558 ✓
+/- 1.9238 ]	%	[ 46.1252 +/- 1.7751	-87.8217 +/- 1.5644	1608.7466 ✓
+/- 1.9483 ]	%	[ 93.6208 +/- 1.9122	-87.5169 +/- 1.6854	1732.3094 ✓
+/- 2.1482 ]	%	[ -149.1790 +/- 2.1788	-77.1570 +/- 1.9147	1966.8865 ✓
+/- 2.5488 ]	%	[ -39.3993 +/- 2.1899	-87.8117 +/- 1.9292	1983.6497 ✓
+/- 2.6029 ]	%	[ -22.8542 +/- 2.1804	-90.2018 +/- 1.9214	1975.6502 ✓
+/- 2.6743 ]	%	[ -23.4968 +/- 2.1187	-88.0273 +/- 1.8672	1920.0904 ✓
+/- 2.8300 ]	%	[ -86.7371 +/- 2.2455	-85.7287 +/- 1.9723	2028.7095 ✓
+/- 2.5992 ]	%	[ -28.0673 +/- 2.3092	-92.5862 +/- 2.0336	2091.5095 ✓
+/- 2.5489 ]	%	[ -6.6342 +/- 2.3460	-88.9121 +/- 2.0670	2125.8677 ✓
+/- 2.6215 ]	%	[ 95.8965 +/- 2.7989	-95.9177 +/- 2.4675	2536.6597 ✓
+/- 3.3964 ]	%	[ 78.5578 +/- 2.8099	-89.1932 +/- 2.4774	2547.3467 ✓
+/- 3.3986 ]	%	[ 138.0554 +/- 2.7782	-80.9015 +/- 2.4510	2518.8980 ✓
+/- 4.0728 ]	%	[ 238.7415 +/- 2.8126	-77.4246 +/- 2.4700	2535.5481 ✓
+/- 3.9547 ]				

%	[	302.4566 +/- 2.7778	-92.9678 +/- 2.4344	2496.3504 ✓
+/- 3.7196 ]				
%	[	160.5311 +/- 2.7328	-87.7582 +/- 2.4064	2472.3871 ✓
+/- 3.5860 ]				
%	[	5.4523 +/- 2.6834	-78.0763 +/- 2.3656	2432.4372 ✓
+/- 3.4671 ]				
%	[	43.2650 +/- 2.7199	-245.4947 +/- 2.4043	2461.5532 ✓
+/- 3.5155 ]				
%	[	44.5244 +/- 2.7211	-243.5841 +/- 2.4052	2462.6705 ✓
+/- 3.5181 ]				
%	[	84.4613 +/- 2.8433	-225.8085 +/- 2.5110	2573.4827 ✓
+/- 3.7764 ]				
%	[	41.6721 +/- 2.8871	-225.7671 +/- 2.5499	2614.1260 ✓
+/- 3.8915 ]				
%	[	-334.8670 +/- 2.9002	-214.3390 +/- 2.5311	2590.0047 ✓
+/- 3.8845 ]				
%	[	17.6539 +/- 2.9223	-223.4710 +/- 2.5817	2646.6818 ✓
+/- 4.0469 ]				
%	[	-13.9963 +/- 2.8877	-220.1032 +/- 2.5547	2614.8575 ✓
+/- 3.7423 ]				
%	[	-70.1439 +/- 2.8186	-220.7571 +/- 2.4906	2549.1306 ✓
+/- 3.3099 ]				
%	[	-97.5005 +/- 2.7789	-222.8868 +/- 2.4533	2511.7541 ✓
+/- 3.3242 ]				
%	[	-176.6425 +/- 2.4793	-222.3143 +/- 2.1842	2233.4402 ✓
+/- 2.8032 ]				
%	[	20.6252 +/- 2.3203	-237.0380 +/- 2.0537	2099.3011 ✓
+/- 2.5322 ]				
%	[	15.8545 +/- 2.2874	-240.7840 +/- 2.0261	2069.8111 ✓
+/- 2.5657 ]				
%	[	-72.0840 +/- 2.2159	-233.9355 +/- 1.9543	2001.5108 ✓
+/- 2.6653 ]				
%	[	7.2851 +/- 2.1632	-240.0816 +/- 1.9111	1955.8837 ✓
+/- 2.5375 ]				
%	[	121.3200 +/- 2.1354	-247.2115 +/- 1.8875	1928.4421 ✓
+/- 2.4826 ]				
%	[	267.7728 +/- 2.1122	-251.7376 +/- 1.8617	1895.2848 ✓
+/- 2.4376 ]				
%	[	81.5977 +/- 1.8840	-239.5557 +/- 1.6655	1701.6898 ✓
+/- 2.0922 ]				
%	[	250.0797 +/- 1.8524	-253.8748 +/- 1.6345	1661.0248 ✓
+/- 2.0475 ]				
%	[	-114.8012 +/- 1.8439	-244.8465 +/- 1.6246	1659.7793 ✓
+/- 2.0261 ]				
%	[	-95.7198 +/- 1.8438	-251.4102 +/- 1.6252	1660.7222 ✓
+/- 2.0513 ]				
%	[	24.6886 +/- 1.9159	-259.8328 +/- 1.6985	1731.2928 ✓
+/- 2.0659 ]				
%	[	63.0862 +/- 1.9665	-262.1179 +/- 1.7428	1777.0130 ✓
+/- 2.0392 ]				
%	[	-106.1275 +/- 1.9640	-267.3390 +/- 1.7353	1768.1788 ✓

+/- 2.0340 ]				
%	[	105.4688 +/- 1.5876	-256.4741 +/- 1.4057	1431.7902 ✓
+/- 1.5599 ]				
%	[	155.1264 +/- 1.4675	-258.4435 +/- 1.3010	1321.4701 ✓
+/- 1.4292 ]				
%	[	59.6669 +/- 1.2878	-274.4165 +/- 1.1425	1157.0049 ✓
+/- 1.2815 ]				
%	[	157.3994 +/- 1.2221	-257.1566 +/- 1.0813	1092.4007 ✓
+/- 1.2292 ]				
%	[	30.3302 +/- 1.1860	-252.1084 +/- 1.0492	1064.6407 ✓
+/- 1.1853 ]				
%	[	115.1254 +/- 1.1637	-256.1006 +/- 1.0308	1042.0811 ✓
+/- 1.1707 ]				
%	[	62.1671 +/- 0.7881	-253.8930 +/- 0.6961	697.8024 ✓
+/- 0.7783 ]				
%	[	22.9532 +/- 0.7640	-252.0120 +/- 0.6707	675.3112 ✓
+/- 0.7316 ]				
%	[	61.2968 +/- 0.8103	-253.5940 +/- 0.7173	721.6813 ✓
+/- 0.7587 ]				
%	[	20.9727 +/- 0.8613	-253.4335 +/- 0.7572	766.7658 ✓
+/- 0.7631 ]				
%	[	32.8782 +/- 0.9741	-259.2825 +/- 0.8584	870.0043 ✓
+/- 0.8613 ]				
%	[	5.6699 +/- 0.9730	-221.6079 +/- 0.8560	871.7271 ✓
+/- 0.8381 ]				
%	[	112.9960 +/- 1.0313	-216.5510 +/- 0.9128	927.6795 ✓
+/- 0.9346 ]				
%	[	54.7460 +/- 1.0897	-210.4277 +/- 0.9655	982.1729 ✓
+/- 1.0294 ]				
%	[	62.4934 +/- 1.1115	-208.0867 +/- 0.9812	1000.0108 ✓
+/- 1.0869 ]				
%	[	108.3442 +/- 1.0923	-197.8555 +/- 0.9641	982.2636 ✓
+/- 1.0759 ]				
%	[	181.1187 +/- 1.1072	-210.1524 +/- 0.9776	990.1165 ✓
+/- 1.1040 ]				
%	[	27.8967 +/- 1.4714	-188.5066 +/- 1.2974	1329.5356 ✓
+/- 1.5206 ]				
%	[	-116.7395 +/- 1.5831	-188.7114 +/- 1.3891	1424.0096 ✓
+/- 1.6496 ]				
%	[	-82.5843 +/- 1.6832	-171.6548 +/- 1.4793	1518.0851 ✓
+/- 1.7965 ]				
%	[	-70.7281 +/- 1.6874	-166.5161 +/- 1.4884	1522.3576 ✓
+/- 1.7708 ]				
%	[	-23.3007 +/- 1.7172	-167.9628 +/- 1.5159	1552.3972 ✓
+/- 1.7202 ]				
%	[	-163.7124 +/- 1.8522	-151.7702 +/- 1.6275	1666.5286 ✓
+/- 1.8745 ]				
%	[	-78.4871 +/- 2.1400	-137.1648 +/- 1.8854	1935.0114 ✓
+/- 2.2950 ]				
%	[	233.8379 +/- 2.1782	-95.0138 +/- 1.9192	1967.2275 ✓
+/- 2.3608 ]				

%	[	-27.7293 +/- 2.1965	-113.6626 +/- 1.9402	1989.0518 ✓
+/- 2.4630 ]				
%	[	-11.5762 +/- 2.2643	-101.1574 +/- 1.9970	2051.8354 ✓
+/- 2.7292 ]				
%	[	-97.8145 +/- 2.3484	-68.8548 +/- 2.0657	2123.7862 ✓
+/- 2.8317 ]				
%	[	81.3328 +/- 2.3635	-76.3738 +/- 2.0839	2142.5379 ✓
+/- 2.8576 ]				
%	[	320.6025 +/- 2.3525	-75.9396 +/- 2.0639	2113.2635 ✓
+/- 2.8225 ]				
%	[	-26.4502 +/- 2.6429	-40.3428 +/- 2.3298	2395.2415 ✓
+/- 3.3522 ]				
%	[	-62.7774 +/- 2.6996	-38.4865 +/- 2.3785	2444.8333 ✓
+/- 3.4850 ]				
%	[	-169.0788 +/- 2.7433	-38.5754 +/- 2.4084	2472.6775 ✓
+/- 3.6008 ]				
%	[	-164.7813 +/- 2.7844	-33.9736 +/- 2.4477	2511.3016 ✓
+/- 3.4107 ]				
%	[	176.1845 +/- 2.7671	-34.2294 +/- 2.4389	2504.3988 ✓
+/- 3.3083 ]				
%	[	-361.5471 +/- 2.7941	-43.0854 +/- 2.4402	2497.9116 ✓
+/- 3.3254 ]				
%	[	50.4317 +/- 1.0839	-306.6473 +/- 0.9689	966.6660 ✓
+/- 1.0640 ]				
%	[	94.9846 +/- 1.0605	-308.7508 +/- 0.9419	941.1772 ✓
+/- 1.0464 ]				
%	[	133.3994 +/- 1.0642	-305.4699 +/- 0.9421	942.1091 ✓
+/- 1.0535 ]				
%	[	113.2028 +/- 1.2473	-273.0784 +/- 1.1052	1116.6977 ✓
+/- 1.2567 ]				
%	[	0.2949 +/- 1.6157	-204.1508 +/- 1.4248	1459.5042 ✓
+/- 1.7067 ]				
%	[	64.3838 +/- 1.9526	-120.7832 +/- 1.7217	1769.4583 ✓
+/- 2.1911 ]				
%	[	28.0492 +/- 1.9744	-120.6877 +/- 1.7411	1789.1985 ✓
+/- 2.2362 ]				
%	[	34.6985 +/- 1.9960	-125.4689 +/- 1.7629	1809.0716 ✓
+/- 2.3035 ]				
%	[	-143.1044 +/- 2.0384	-128.9748 +/- 1.7922	1832.9040 ✓
+/- 2.3354 ]				
%	[	-114.7668 +/- 2.1229	-115.2785 +/- 1.8709	1915.6350 ✓
+/- 2.3652 ]				
%	[	-12.6612 +/- 2.1932	-104.9116 +/- 1.9357	1986.7016 ✓
+/- 2.4347 ]				
%	[	62.2470 +/- 2.6702	-380.1709 +/- 2.3868	2410.4834 ✓
+/- 3.2330 ]				
%	[	169.8527 +/- 2.6553	-378.4740 +/- 2.3780	2394.7234 ✓
+/- 3.2779 ]				
%	[	58.4967 +/- 2.6957	-376.7137 +/- 2.4184	2434.6732 ✓
+/- 3.6013 ]				
%	[	-92.1588 +/- 2.6596	-383.8071 +/- 2.3664	2395.3002 ✓

```
+/- 3.4558  ]
%           [   91.9640 +/- 2.6917    -382.5618 +/- 2.3988    2428.3657 ✓
+/- 3.4906  ]
%           [  363.8715 +/- 2.7012    -366.3155 +/- 2.3859    2408.1008 ✓
+/- 3.4525  ]
```