```
%%%%% Assume that the object is located at (3,4) %%%%%
%%%%% Position of the object measured 500 times %%%%%%
dataWithError = [];
for i=1:500
  % 3 + {0 < number > 1} %
  x = 3 + rand;
  % 4 + \{0 < \text{number} > 1\} %
  y = 4 + rand;
  % Distance to origin %
  dataWithError(end+1) = sqrt(x^2 + y^2);
end
%%%% FILL z OF KALMAN FILTER WITH DATA WITH ERROR %%%%
z(:,1) = 0;
for m = 1:length(dataWithError)
  z(:,m+1) = dataWithError(m);
end
%%%%%% INITIALIZE VARIABLES OF KALMAN FILTER %%%%%%%%
H = 1;
F = 1;
G = 1;
u = 0;
N = length(dataWithError);
R = std(dataWithError);
I = 1;
Q = 0;
P = 1;
%%%%%%%%%% RUN KALMAN FILTER ALGORITH %%%%%%%%%%%%%%%%
x(:, 1) = 0;
for k = 2:N
  x(:, k) = F*x(:, k-1) + G*u;
  P = F*P*F' + Q;
  K = P*H' / (H*P*H' + R);
  x(:,k) = x(:,k) + K*(z(k) - H*x(:,k));
  P = (I - K*H)*P;
end
%%%% DISPLAY AND PLOT KALMAN PREDICTION VARIABLE %%%%
disp(x);
```

| Columns 1 t | chrough 7 | | | | | | |
|-------------|------------|-----|-----|--------|--------|--------|--------|
| 0 | 4.3990 | 4.8 | 504 | 5.0164 | 5.2312 | 5.2971 | 5.3346 |
| Columns 8 t | through 14 | | | | | | |
| 5.4221 | 5.4207 | 5.4 | 270 | 5.4602 | 5.4941 | 5.4909 | 5.5095 |
| Columns 15 | through 2 | ?1 | | | | | |
| 5.4986 | 5.5294 | 5.5 | 189 | 5.5443 | 5.5806 | 5.5930 | 5.5954 |
| Columns 22 | through 2 | 28 | | | | | |
| 5.6143 | 5.6083 | 5.5 | 965 | 5.5925 | 5.5934 | 5.5804 | 5.6044 |
| Columns 29 | through 3 | 35 | | | | | |
| 5.5904 | 5.6137 | 5.6 | 316 | 5.6493 | 5.6546 | 5.6627 | 5.6647 |
| Columns 36 | through 4 | 12 | | | | | |
| 5.6696 | 5.6814 | 5.6 | 698 | 5.6738 | 5.6657 | 5.6579 | 5.6686 |
| Columns 43 | through 4 | !9 | | | | | |
| 5.6740 | 5.6726 | 5.6 | 654 | 5.6709 | 5.6741 | 5.6685 | 5.6708 |
| Columns 50 | through 5 | i6 | | | | | |
| 5.6784 | 5.6830 | 5.6 | 857 | 5.6821 | 5.6851 | 5.6892 | 5.6924 |
| Columns 57 | through 6 | 3 | | | | | |
| 5.6903 | 5.6924 | 5.6 | 961 | 5.6932 | 5.7019 | 5.7046 | 5.7012 |
| Columns 64 | through 7 | 0 | | | | | |
| 5.6922 | 5.6981 | 5.6 | 991 | 5.6971 | 5.7054 | 5.7122 | 5.7168 |
| Columns 71 | through 7 | 7 | | | | | |
| 5.7206 | 5.7271 | 5.7 | 333 | 5.7346 | 5.7389 | 5.7448 | 5.7480 |
| Columns 78 | through 8 | 14 | | | | | |
| 5.7508 | 5.7496 | 5.7 | 451 | 5.7450 | 5.7448 | 5.7404 | 5.7431 |
| Columns 85 | through 9 | 1 | | | | | |
| 5.7385 | 5.7355 | 5.7 | 352 | 5.7272 | 5.7322 | 5.7323 | 5.7346 |
| Columns 92 | through 9 | 8 | | | | | |

| 5.7345 | 5.7363 | 5.7409 | 5.7434 | 5.7416 | 5.7359 | 5.7374 |
|--------------|------------|--------|--------|--------|--------|--------|
| Columns 99 t | through 10 | 5 | | | | |
| 5.7387 | 5.7362 | 5.7397 | 5.7405 | 5.7397 | 5.7365 | 5.7307 |
| Columns 106 | through 1 | 12 | | | | |
| 5.7285 | 5.7320 | 5.7301 | 5.7249 | 5.7292 | 5.7283 | 5.7241 |
| Columns 113 | through 1 | 19 | | | | |
| 5.7268 | 5.7296 | 5.7289 | 5.7291 | 5.7261 | 5.7231 | 5.7231 |
| Columns 120 | through 1 | 26 | | | | |
| 5.7229 | 5.7284 | 5.7292 | 5.7308 | 5.7308 | 5.7277 | 5.7275 |
| Columns 127 | through 1 | 33 | | | | |
| 5.7254 | 5.7278 | 5.7293 | 5.7303 | 5.7263 | 5.7283 | 5.7242 |
| Columns 134 | through 1 | 40 | | | | |
| 5.7255 | 5.7262 | 5.7250 | 5.7254 | 5.7231 | 5.7238 | 5.7223 |
| Columns 141 | through 1 | 47 | | | | |
| 5.7233 | 5.7227 | 5.7235 | 5.7215 | 5.7213 | 5.7175 | 5.7183 |
| Columns 148 | through 1 | 54 | | | | |
| 5.7179 | 5.7182 | 5.7210 | 5.7235 | 5.7256 | 5.7259 | 5.7243 |
| Columns 155 | through 1 | 61 | | | | |
| 5.7224 | 5.7226 | 5.7257 | 5.7293 | 5.7288 | 5.7271 | 5.7272 |
| Columns 162 | through 1 | 68 | | | | |
| 5.7246 | 5.7230 | 5.7240 | 5.7254 | 5.7244 | 5.7250 | 5.7285 |
| Columns 169 | through 1 | 75 | | | | |
| 5.7308 | 5.7301 | 5.7300 | 5.7328 | 5.7300 | 5.7313 | 5.7302 |
| Columns 176 | through 1 | 82 | | | | |
| 5.7313 | 5.7313 | 5.7302 | 5.7298 | 5.7280 | 5.7274 | 5.7300 |
| Columns 183 | through 1 | 89 | | | | |
| 5.7309 | 5.7303 | 5.7333 | 5.7315 | 5.7294 | 5.7303 | 5.7281 |

| Columns 190 | through | 196 | | | | |
|-------------|---------|--------|--------|--------|--------|--------|
| 5.7275 | 5.7268 | 5.7295 | 5.7321 | 5.7340 | 5.7334 | 5.7325 |
| Columns 197 | through | 203 | | | | |
| 5.7345 | 5.7349 | 5.7344 | 5.7329 | 5.7313 | 5.7308 | 5.7306 |
| Columns 204 | through | 210 | | | | |
| 5.7307 | 5.7324 | 5.7319 | 5.7301 | 5.7315 | 5.7318 | 5.7316 |
| Columns 211 | through | 217 | | | | |
| 5.7322 | 5.7329 | 5.7336 | 5.7348 | 5.7353 | 5.7355 | 5.7355 |
| Columns 218 | through | 224 | | | | |
| 5.7365 | 5.7366 | 5.7372 | 5.7347 | 5.7344 | 5.7328 | 5.7342 |
| Columns 225 | through | 231 | | | | |
| 5.7339 | 5.7333 | 5.7321 | 5.7311 | 5.7330 | 5.7352 | 5.7332 |
| Columns 232 | through | 238 | | | | |
| 5.7312 | 5.7336 | 5.7337 | 5.7331 | 5.7320 | 5.7311 | 5.7300 |
| Columns 239 | through | 245 | | | | |
| 5.7294 | 5.7299 | 5.7294 | 5.7291 | 5.7283 | 5.7275 | 5.7288 |
| Columns 246 | through | 252 | | | | |
| 5.7305 | 5.7299 | 5.7289 | 5.7288 | 5.7302 | 5.7303 | 5.7308 |
| Columns 253 | through | 259 | | | | |
| 5.7331 | 5.7327 | 5.7349 | 5.7366 | 5.7383 | 5.7374 | 5.7370 |
| Columns 260 | through | 266 | | | | |
| 5.7375 | 5.7371 | 5.7381 | 5.7371 | 5.7366 | 5.7368 | 5.7380 |
| Columns 267 | through | 273 | | | | |
| 5.7375 | 5.7391 | 5.7410 | 5.7408 | 5.7410 | 5.7385 | 5.7388 |
| Columns 274 | through | 280 | | | | |
| 5.7389 | 5.7376 | 5.7395 | 5.7374 | 5.7375 | 5.7360 | 5.7352 |
| Columns 281 | through | 287 | | | | |

| 5.7366 | 5.7368 | 5.7367 | 5.7383 | 5.7376 | 5.7368 | 5.7374 |
|-------------|---------|--------|--------|--------|--------|--------|
| Columns 288 | through | 294 | | | | |
| 5.7359 | 5.7377 | 5.7383 | 5.7392 | 5.7413 | 5.7410 | 5.7403 |
| Columns 295 | through | 301 | | | | |
| 5.7386 | 5.7384 | 5.7376 | 5.7387 | 5.7377 | 5.7385 | 5.7388 |
| Columns 302 | through | 308 | | | | |
| 5.7384 | 5.7374 | 5.7367 | 5.7365 | 5.7369 | 5.7384 | 5.7389 |
| Columns 309 | through | 315 | | | | |
| 5.7393 | 5.7381 | 5.7365 | 5.7347 | 5.7360 | 5.7343 | 5.7346 |
| Columns 316 | through | 322 | | | | |
| 5.7337 | 5.7337 | 5.7338 | 5.7327 | 5.7330 | 5.7322 | 5.7326 |
| Columns 323 | through | 329 | | | | |
| 5.7322 | 5.7320 | 5.7335 | 5.7328 | 5.7317 | 5.7322 | 5.7319 |
| Columns 330 | through | 336 | | | | |
| 5.7321 | 5.7316 | 5.7327 | 5.7329 | 5.7320 | 5.7334 | 5.7318 |
| Columns 337 | through | 343 | | | | |
| 5.7318 | 5.7317 | 5.7310 | 5.7326 | 5.7323 | 5.7309 | 5.7303 |
| Columns 344 | through | 350 | | | | |
| 5.7310 | 5.7305 | 5.7296 | 5.7290 | 5.7295 | 5.7293 | 5.7288 |
| Columns 351 | through | 357 | | | | |
| 5.7300 | 5.7302 | 5.7302 | 5.7310 | 5.7312 | 5.7300 | 5.7280 |
| Columns 358 | through | 364 | | | | |
| 5.7284 | 5.7274 | 5.7262 | 5.7266 | 5.7269 | 5.7272 | 5.7285 |
| Columns 365 | through | 371 | | | | |
| 5.7286 | 5.7284 | 5.7281 | 5.7285 | 5.7275 | 5.7274 | 5.7276 |
| Columns 372 | through | 378 | | | | |
| 5.7287 | 5.7280 | 5.7286 | 5.7281 | 5.7274 | 5.7275 | 5.7284 |

| Columns 379 | through | 385 | | | | |
|-------------|---------|--------|--------|--------|--------|--------|
| 5.7279 | 5.7264 | 5.7256 | 5.7248 | 5.7257 | 5.7252 | 5.7249 |
| Columns 386 | through | 392 | | | | |
| 5.7241 | 5.7248 | 5.7246 | 5.7240 | 5.7232 | 5.7229 | 5.7238 |
| Columns 393 | through | 399 | | | | |
| 5.7231 | 5.7227 | 5.7234 | 5.7241 | 5.7236 | 5.7245 | 5.7242 |
| Columns 400 | through | 406 | | | | |
| 5.7250 | 5.7258 | 5.7249 | 5.7252 | 5.7255 | 5.7252 | 5.7265 |
| Columns 407 | through | 413 | | | | |
| 5.7268 | 5.7267 | 5.7270 | 5.7273 | 5.7286 | 5.7288 | 5.7280 |
| Columns 414 | through | 420 | | | | |
| 5.7274 | 5.7275 | 5.7268 | 5.7261 | 5.7261 | 5.7255 | 5.7256 |
| Columns 421 | through | 427 | | | | |
| 5.7254 | 5.7258 | 5.7257 | 5.7270 | 5.7271 | 5.7272 | 5.7267 |
| Columns 428 | through | 434 | | | | |
| 5.7258 | 5.7252 | 5.7256 | 5.7243 | 5.7232 | 5.7244 | 5.7240 |
| Columns 435 | through | 441 | | | | |
| 5.7246 | 5.7248 | 5.7252 | 5.7247 | 5.7255 | 5.7256 | 5.7265 |
| Columns 442 | through | 448 | | | | |
| 5.7263 | 5.7267 | 5.7270 | 5.7263 | 5.7268 | 5.7272 | 5.7276 |
| Columns 449 | through | 455 | | | | |
| 5.7282 | 5.7287 | 5.7290 | 5.7289 | 5.7287 | 5.7284 | 5.7283 |
| Columns 456 | through | 462 | | | | |
| 5.7283 | 5.7279 | 5.7271 | 5.7263 | 5.7265 | 5.7268 | 5.7264 |
| Columns 463 | through | 469 | | | | |
| 5.7262 | 5.7257 | 5.7247 | 5.7233 | 5.7233 | 5.7234 | 5.7228 |
| Columns 470 | through | 476 | | | | |

| 5.7227 | 5.7231 | 5.7218 | 5.7218 | 5.7212 | 5.7204 | 5.7212 |
|-------------|------------|--------|--------|--------|--------|--------|
| Columns 477 | through 48 | 83 | | | | |
| 5.7216 | 5.7211 | 5.7213 | 5.7204 | 5.7203 | 5.7199 | 5.7206 |
| Columns 484 | through 4 | 90 | | | | |
| 5.7206 | 5.7205 | 5.7206 | 5.7208 | 5.7198 | 5.7202 | 5.7202 |
| Columns 491 | through 4 | 97 | | | | |
| 5.7200 | 5.7211 | 5.7214 | 5.7208 | 5.7216 | 5.7214 | 5.7205 |
| Columns 498 | through 50 | 00 | | | | |
| 5.7199 | 5.7199 | 5.7203 | | | | |

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