Applied Kalman Filtering
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Part 6: Sensitivity Analysis and Error Budgets

Background: Consider the two-dimensional tracking problem and the extended Kalman filter developed in Part 4 and 5.

Tasks:

1. Run the simulation and determine the time at which the height above the radar is about 10 m. Denote that time t_s
2. Run the EKF up to time t_s and store the optimal Kalman gain matrix at each t_k for use in the error budget table computations. Plot each element of the Kalman gain matrix .
3. Create a set of error groups. Suggest that you form the error groups around the elements of the initial state estimation error covariance matrix, the constant process noise spectral density, $\mathbf{Q}_s$ and the constant measurement noise covariance, $\mathbf{R}$
4. At t_s, create an error budget table and quantify the state estimation error contributions of each error group to each state estimation error uncertainty (as represented by the state estimation error covariance)
5. Using the error budget table in (4), create a set of sensitivity plots