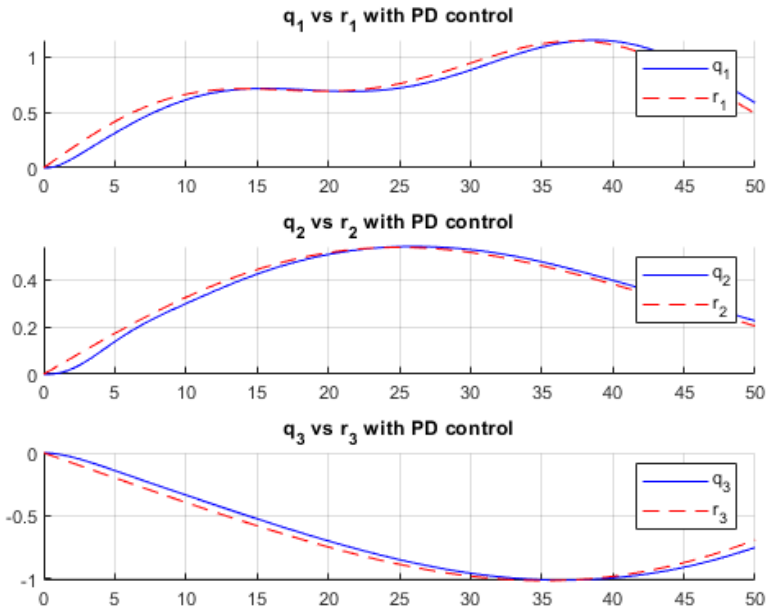
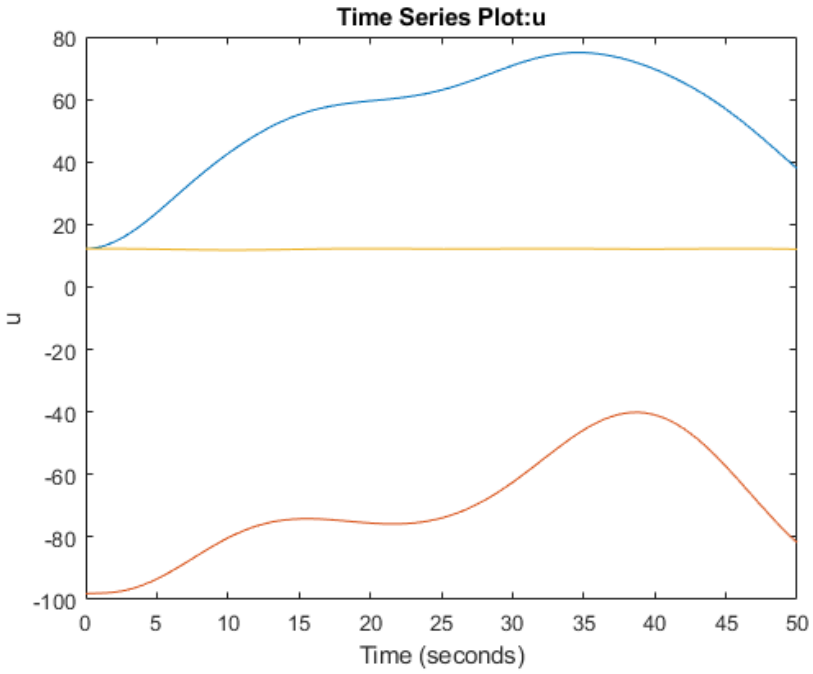
Task 2, plots of results:

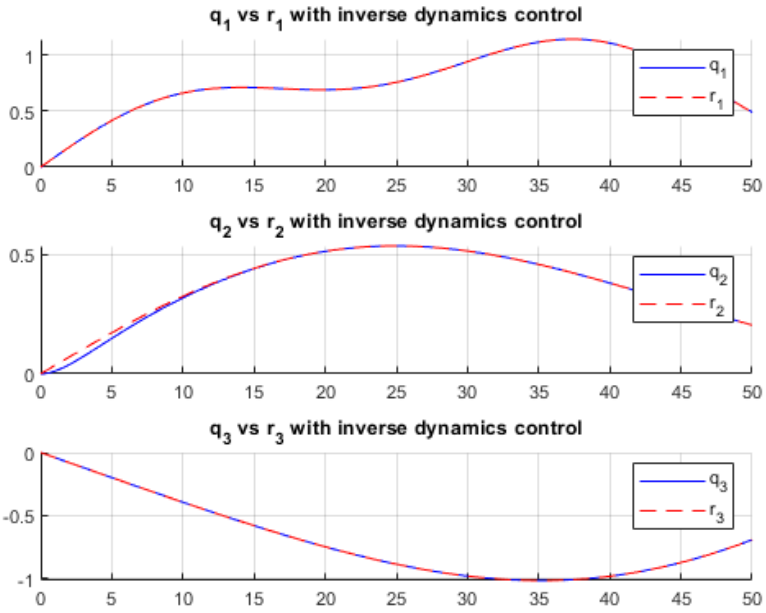
As expected, the more elaborate inverse dynamics controller has much better performance, this owing to the fact that is uses a perfect model assumption, as well as perfect measurements to cancel nonlinear dynamics..

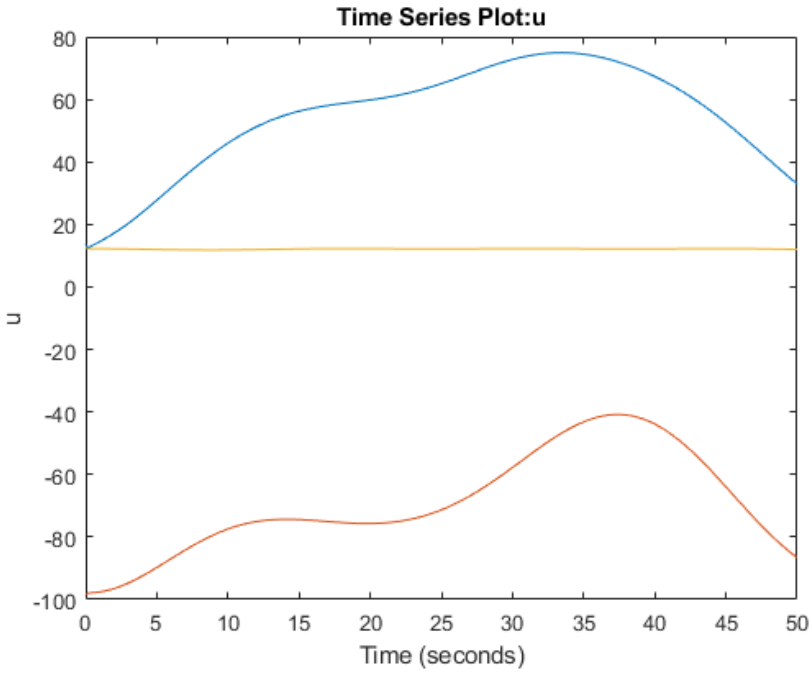
Response using PD control for each state, with gravity compensation, assumes rdot = 0.





Response using inverse dynamics control, using analytical expressions for entire reference vector.





All tuning params can be found in appended MATLAB script.