Recommended Assessment

State Space Modeling

1. From Step 1 of Creating the State Space Representation, show work for relating the motor position relating the motor position, θ_m, and its derivatives with the motor input voltage, $v_m(t)$.

2. Show your work for deriving the state space representation of the DC motor. Use the following state variables:
   $x_1 = \theta_m(t)$, $x_2 = \dot{\theta}_m(t)$,
   $y_1 = \theta_m(t)$, and $y_2 = \dot{\theta}_m(t)$ (measuring motor position and speed)
   and the input variable $u = v_m$.

3. From Step 4 of Creating the State Space Representation, attach the simulated response of the state space model.

4. Attach the screenshot captured of the Speed (rad/s) scope of the measured vs. state space model responses. Describe the differences in the responses between the state space model and the physical response.

5. Explain potential causes of any differences in response from the previous question.