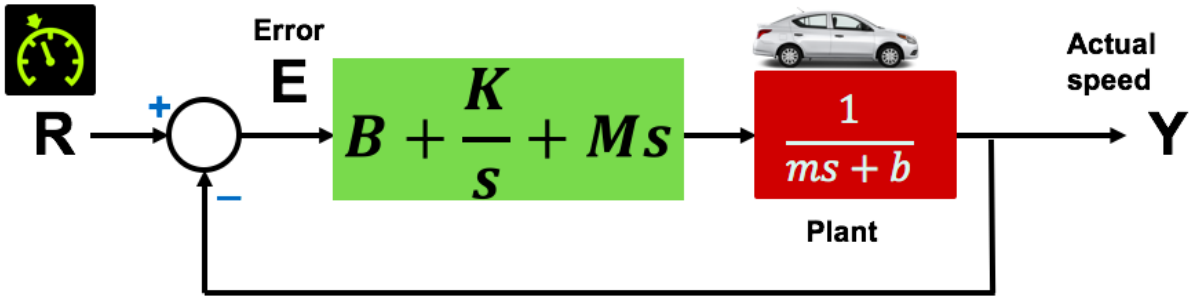
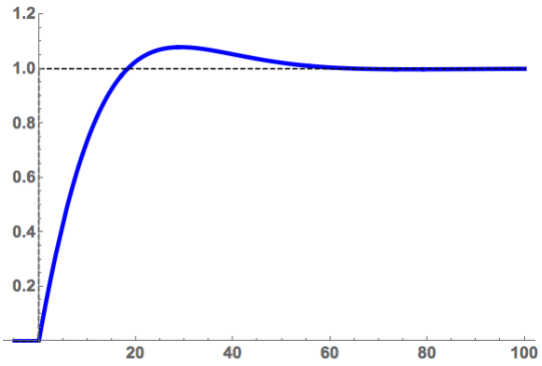
Tufts University
EE105 Feedback Control Systems, Fall 2018
Prof. Brian Aull
Homework #4 Due **Tuesday, October 9**

Cruise control design

You will now "tune" a PID controller for a car with mass m = 1000 kg, and friction coefficient b = 50 N/m/s. The proportional coefficient B (N/m/s), the integral coefficient K (N/m), and the derivative coefficient M (kg) can be chosen freely. But you must meet design specs as shown below for the system's response to a unit step R = u(t) (m/s).

Suggestions: the formulas for rise time, overshoot, etc, discussed in connection with a mass-spring-damper system are only guidelines to use as a starting point. Because the transfer function here can have zeros as well as poles, things will be a bit different, so you'll need to tune your design by trial and error, using Matlab or Mathematica plots.





Rise time < 20s
Overshoot < 10%
Zero steady-state error
Settles to within 1% of steady state in < 60s
No abrupt jumps or infinite gain as frequency goes to infinity