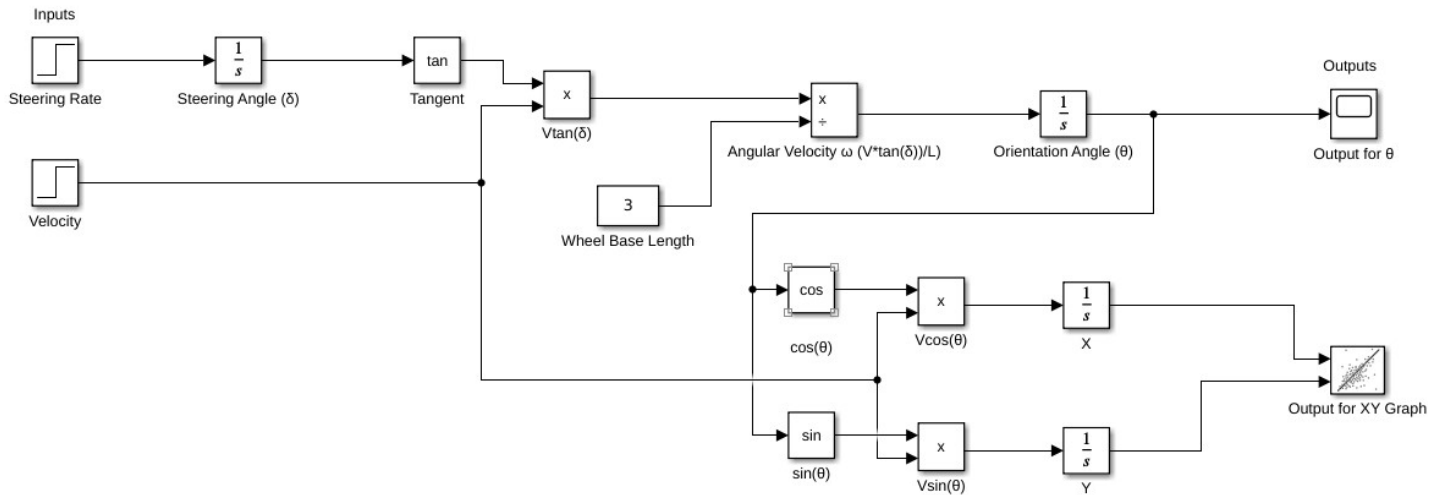


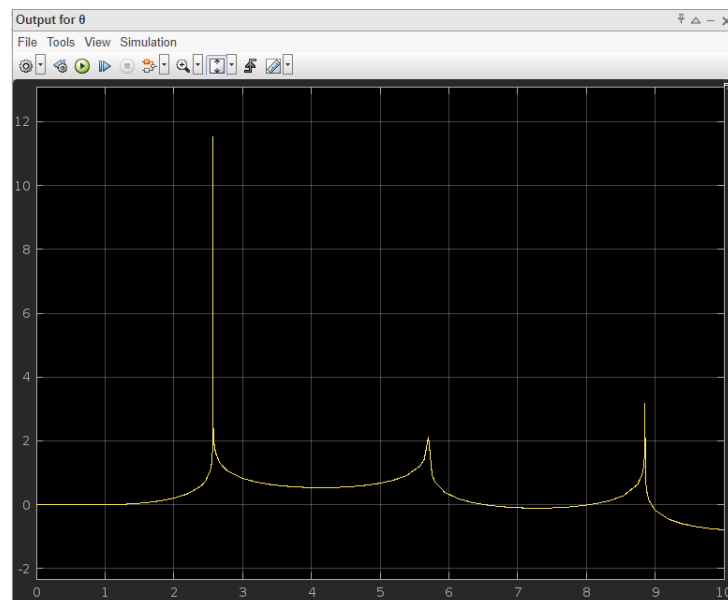
Intro to Autonomous Vehicles – Programming Assignment 1 – Daniel Taylor

1. Reference point is at the center of the rear axle.

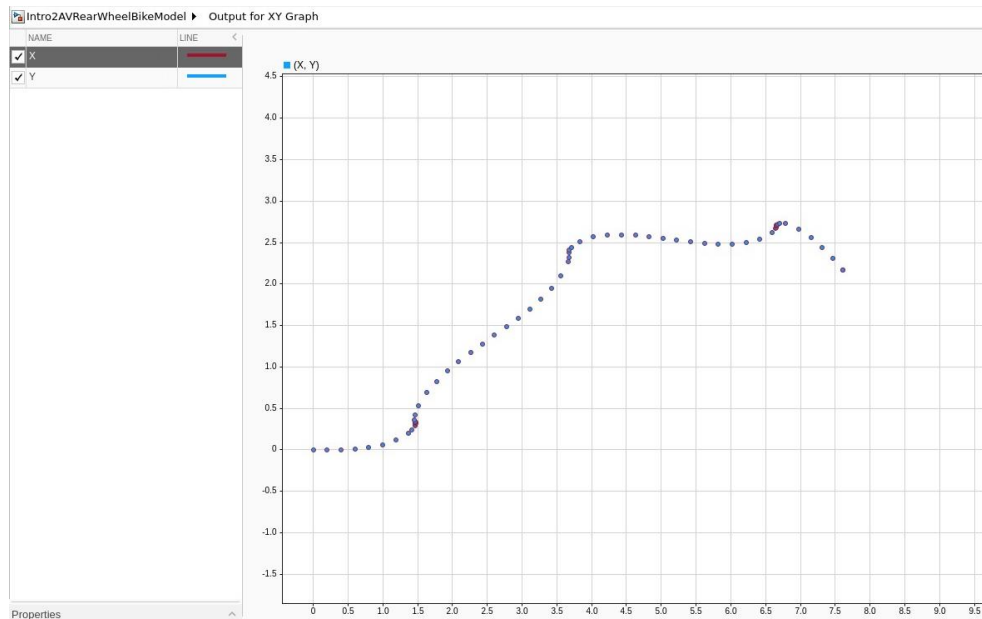
Simulink



Theta Output Graph



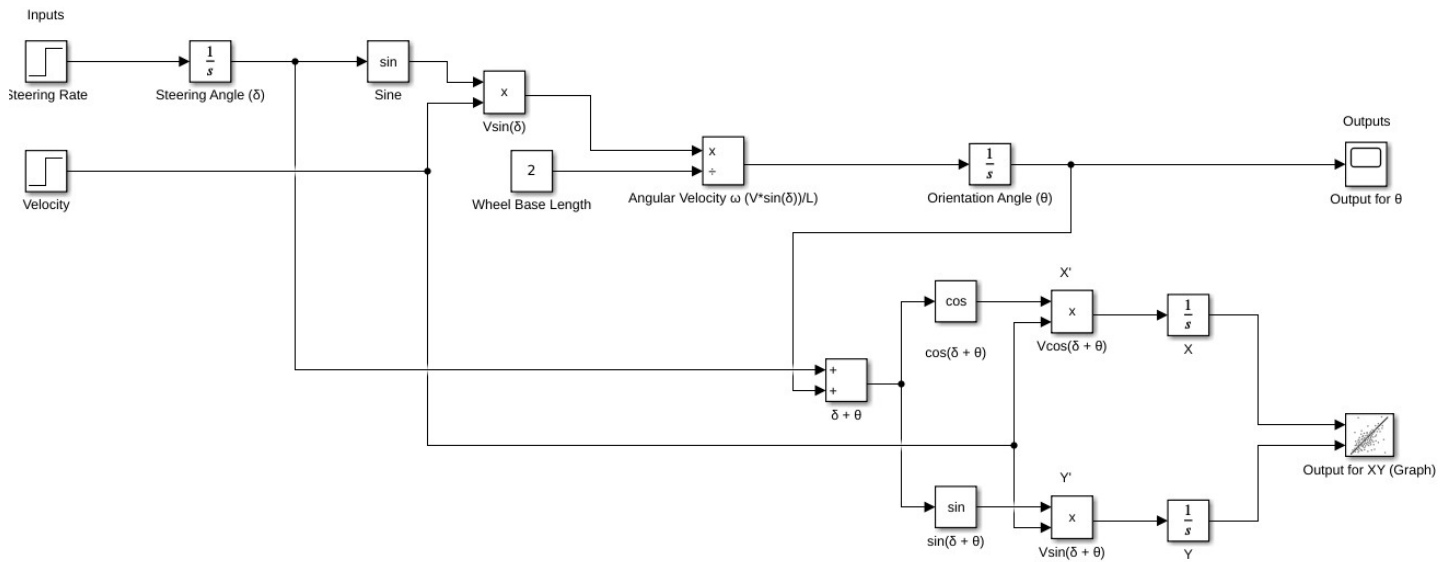
X-Y Output Graph



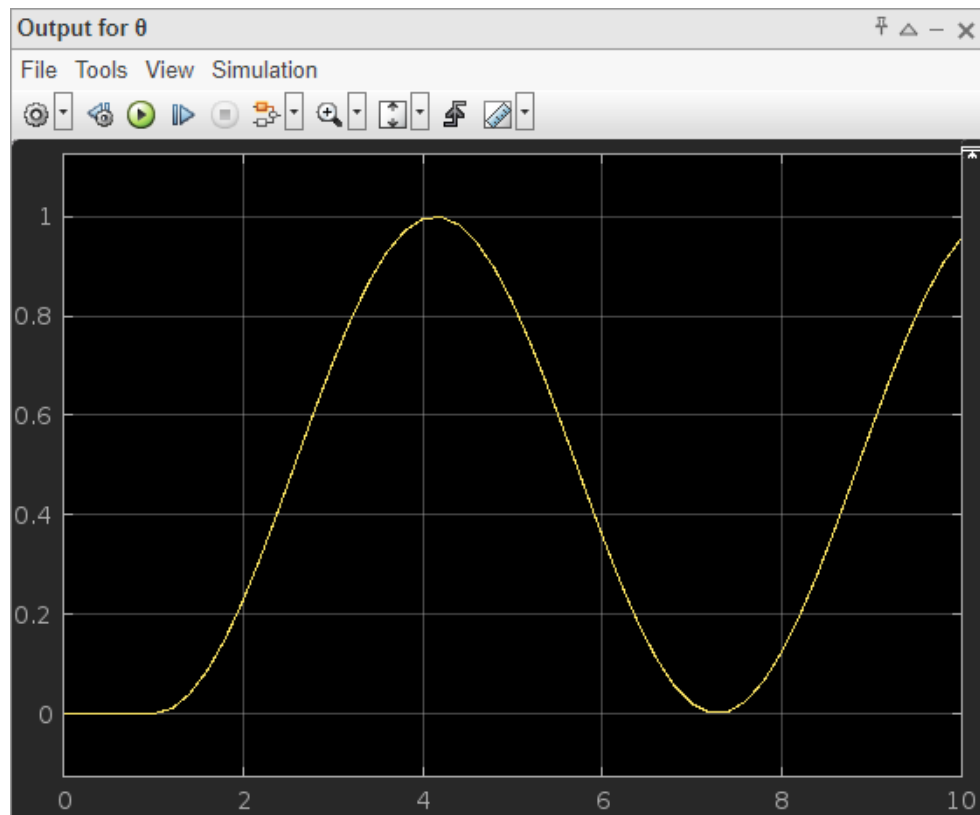
As seen in the graph, the model shows the bicycle moving on the xy-plane. Since the steering rate is increasing via step function, the steering angle must also increase, therefore the bicycle is turning. It seems as if the bicycle travels at a constant rate for a moment of time, and then it turns a few times. I thought the graph should be circular since the bike is constantly turning due to the step function constantly increasing the steering angle, but this is what Simulink gave me. The directions were vague on what sources to use, or what value to use as L , so I used the step function and kept L at a constant 3.

2. Reference point is at the center of the front axle.

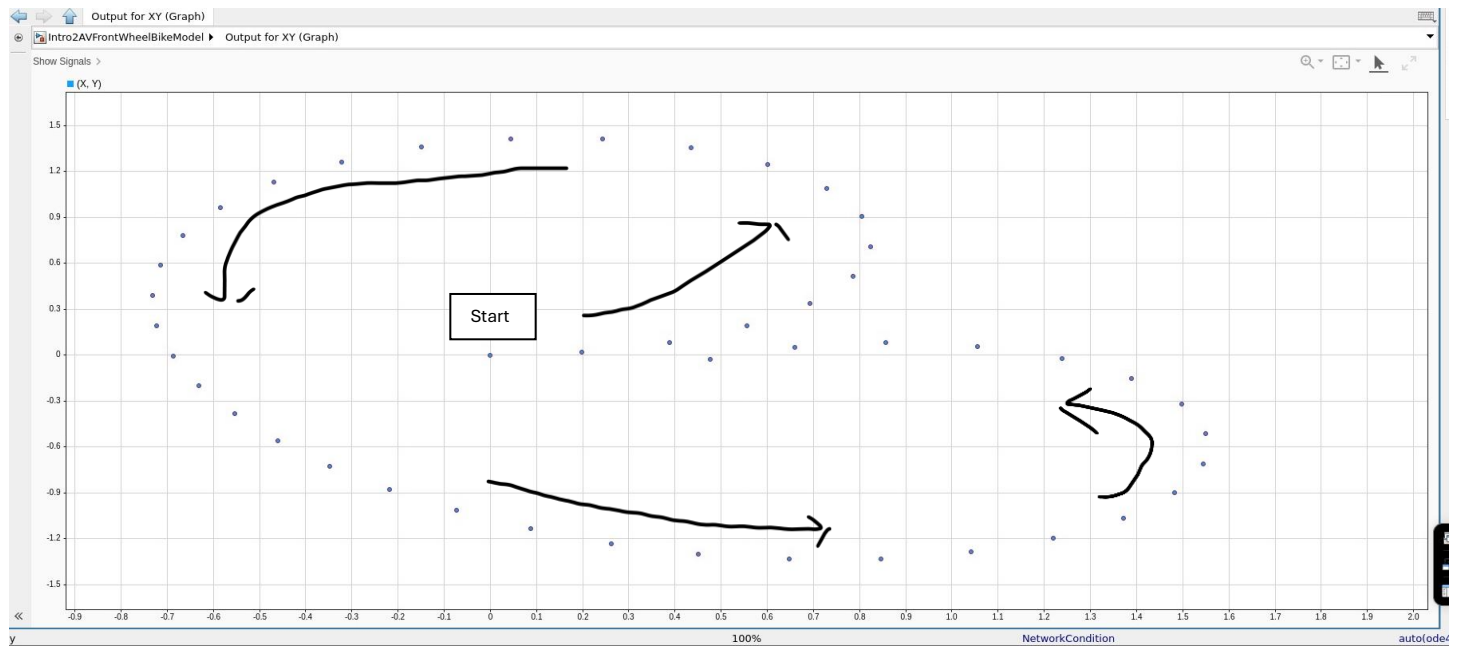
Simulink



Theta Output Graph



X-Y Output Graph



As seen in the graph, the model shows the bicycle moving on the xy-plane. Since the steering rate is increasing via step function, the steering angle must also increase, therefore the bicycle is turning. Also, the graph makes sense considering the velocity and steering rate/angle is increasing with time. Since the bicycle is constantly turning, one can reason that the graph should be somewhat circular. The theta output is also sinusoidal, which makes sense considering the angular velocity is $V\sin(\delta)/L$.

Since the graph may be hard to understand at first, I also added a textbox and arrows indicating where I believe the bike starts its motion, and how it travels on the xy-plane. The directions were vague on what sources to use, or what value to use as L , so I used the step function and kept L at a constant 3 much like the first problem.