**6.1 Coding**

1. There is an advantage to the way it was instructed because the value 3.72 m/s2 only applies to the Martian gravity. This value could change if the mission was to send the robot to a different planet or atmosphere. I would not have done this differently due to the fact that this method is so effective, especially if the value needs to be modified.

2. At first, when 110 degrees is used when F\_gravity is called, it gives us an error that we used saying it is not practical. Even without the error, it is easy to understand that at the speed the rover is going, it would be impossible to climb a 110 degree surface. After commenting out that error, we got big negative force being applied to the rover, which makes it less probable to travel on the surface with that angle.

**6.2 Motor and Speed Reducuer Behavior**

3. According to the graphs from the function file “graphs\_motor.m,” the maximum power output by a single rover motor is about 180 W. This power output occurs at around a motor shaft speed of 2 rad/s. Graphs Provided Later

4. The impact the speed reducer has on the power output of the drive system is that it increases up to a certain torque or speed, and it begins to slowly decrease.

**6.3 Rover Behavior**

5. The trend in the graph illustrates that as the angle of the terrain increases, the maximum velocity decreases. It makes sense physically because if the rover functions at a constant power, the velocity will not change. In other words, if the terrain angle increases, the rover will need more power to continue at the same velocity, but since it is a constant power, the velocity decreases. In the graph, it is not completely linear because it begins to curve very slightly after ten degrees.

6. The trend in the graph of analysis\_rolling\_resistance.m is linearly decreasing in a way that if coefficient of rolling resistance increases, the maximum velocity decreases. It makes sense physically because the coefficient is much higher in surfaces such as sandy soil than on smooth rock. This means that it is much more difficult to maintain a high velocity on the sandy soil because of the loose surface than on the smooth rock surface that contains more traction.

7. This graph of the combined terrain analysis shows that the rover is best to operate under the conditions of low rolling resistance coefficient, low angle of terrain, and medium velocity. Based on the graph, coefficient of rolling resistance is the dominant consideration because at Crr=0 the velocity value is .25 and at Crr=.4 the velocity value is at .12, which is a huge difference in comparison to the terrain slope. The terrain slope at 40 gives a value of .07 in the velocity axis, and a value of .12 at a terrain slope of -10. So the difference is much greater in the coefficient.