1. Calculate the no load speed in MPH (miles per hour) of a robot with the following equipment

- Two motors: no load speed is 5700 RPM (revolutions per minute)
- Gearboxes attached to motors are 16:1 ratio, which means the motor must turn 16 revolutions for each revolution of the wheel
- Assume the gearbox is 100% efficient
- The wheel diameter is 6.00 inches

Calculate the speed to two places past the decimal.

Things to keep in mind:

- For each rotation of the wheel, the robot moves a distance equal to the circumference of the wheel
- The circumference of a circle is calculated from the diameter by multiplying by pi (3.14).
- A mile is equal to 5,280 feet
- There are 12 inches in one foot
- There are 60 minutes in one hour

2. You test your robot to determine its speed. You find that the robot travels a distance of 25 feet in 2 seconds. What is the speed in feet per second? What is the speed in MPH? (calculate to 2 places past decimal).

3. You test another robot and find that it travels 50 feet in 7 seconds. What is the speed in feet per second? What is the speed in MPH?

4. A robot containing GEAR parts was tested on the La Favre driveway. Several runs of a length of 25 feet were completed, both up and down the driveway, which has a slight slope (slope was not measured). The robot ran up and down the driveway at the same speed. Then something happened to the robot. It could no longer run up the driveway, only down the driveway. Taking the robot back in the lab, and opening up the gearboxes, it was discovered that the gear on the motor shaft of one motor was no longer tight on the shaft (i.e., the gear might slip on the shaft when motor is running). The gear on the other motor was still tight.

- Why could the robot no longer move at all going uphill after the one gear was no longer tight on the motor shaft?
- Why could the robot continue to run downhill after one gear was not tight (the robot traveled in a straight path downhill)?
- Do you think these motors will be adequate for the AVC project? If not, what would you change to improve the robot drive system?