When an automobile rounds a curve at high speed (in the figure below the car is turning left), the loading (weight distribution) on the wheels is markedly changed. For sufficiently high speeds the loading on the inside wheel goes to zero, at which point the car starts to roll over. The tendency can be avoided by mounting a large spinning flywheel on the car.

a) What should be the sense of rotation of the flywheel to help equalize the loading? (Be sure that your method works for cars turning in either direction.)

b) Show that for a disk-shaped flywheel of mass $m_w$ and radius $R$, the requirement for equal loading is that the angular velocity of the flywheel, $\omega_f$, is related to the speed of the car $v_{cm}$ by

$$\omega_f = 2v_{cm} \frac{m_c h}{m_w R^2},$$

where $m_c$ is the total mass of the car and flywheel, and $h$ is the height of the center of mass of the car (including the flywheel) above the road. Assume the road is unbanked.