Name _____ Date _____ Period_____

The angular momentum of the propeller of a small single-engine airplane points forward.
The propeller rotates clockwise if viewed from behind.

(*a*) Just after liftoff, as the nose of the plane tilts upward, the airplane tends to veer to one side. To which side does it tend to veer and why?

The plane tends to veer to the right. The change in angular momentum $\Delta \boldsymbol{L}_{\text{prop}}$ for the propeller is upward, so the net torque $\boldsymbol{\tau}$ on the propeller is upward as well. The propeller must exert an equal but opposite torque on the plane. This downward torque exerted on the plane by the propeller tends to cause a downward change in the angular momentum of the plane. This means the plane tends to rotate clockwise as viewed from above.

(*b*) If the plane is flying horizontally and suddenly turns to the right, does the nose of the plane tend to veer upward or downward? Why?

The nose of the plane tends to veer downward. The change in angular momentum $\Delta \boldsymbol{L}$ prop for the propeller is to the right, so the net torque $\boldsymbol{\tau}$ on the propeller is toward the right as well. The propeller must exert an equal but opposite torque on the plane. This leftward directed torque exerted by the propeller on the plane tends to cause a leftward-directed change in angular momentum for the plane. This means the plane tends to rotate clockwise as viewed from the right.