31.1. Simply put—rotation about the intermediate axis is irregular.

31.2. \( \Phi \) is about space \( \hat{z} \) — get new \( \hat{x} \) and \( \hat{y} \) axes, call them \( \hat{e}_1' \) and \( \hat{e}_2' \).

\( \Phi \) is about \( \hat{e}_2' \) — get new \( \hat{x} \), and \( \hat{e}_2 \).

\( \Phi \) is about \( \hat{e}_3' \).

Hold a book, front cover up, spine toward you. => Call \( z \) right, \( \hat{z} \) up. => Front cover away, spine down.

32.1. There are several, but these are best:
1. Total angular momentum (\( L = L_x \hat{e}_x + L_y \hat{e}_y + L_z \hat{e}_z \))
2. Angle between \( \hat{e}_z \) and \( \hat{z} \).
3. Angle between \( L \) and \( \hat{e}_z \).

32.2. \( \Phi \) precession, \( \Theta \) nutation (tipping)
4. Spin

32.3. \( \Phi \) and \( \Theta \) \( \Rightarrow \) Precessional and spin angular momenta (\( L_{\hat{e}_x} \) and \( L_{\hat{e}_y} \)).

32.4. Nutation is the tipping (or bobbing) motion of the top's symmetry axis.

It depends on \( \Theta \).