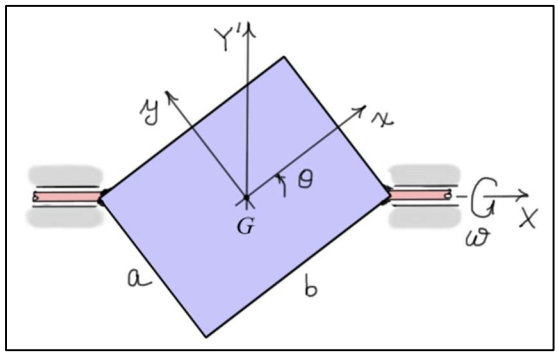
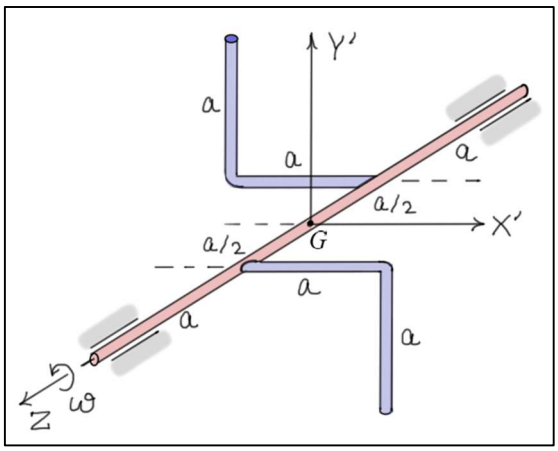
Intermediate Dynamics
Exercises #6

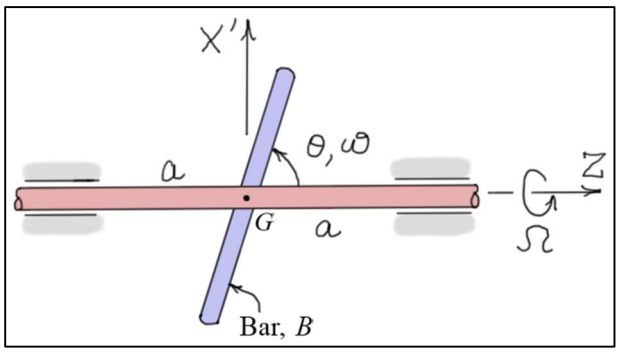
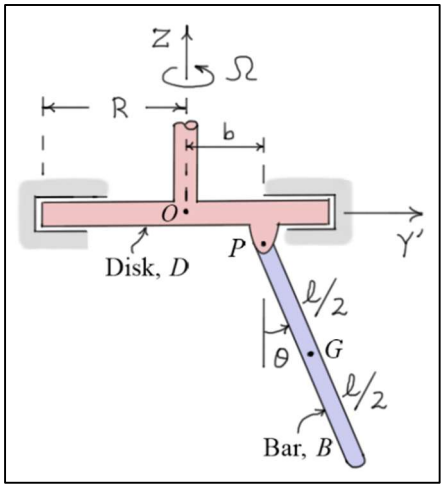
1) The rectangular plate P is welded to a shaft, so it rotates about its diagonal. (a) Find $\underset{\sim}{H}_G$ the angular momentum of P about its mass-center G. Express the results in the X, Y', and Z' shaft-fixed directions. (b) Find K the kinetic energy of the plate.



2) The system shown consists of two L-shaped arms welded to a shaft of length $3a$. The planes of the arms are at right-angles to the shaft. Complete the following assuming all parts are made of "slender" bars. (a) Find $\underset{\sim}{H}_G$ the angular momentum of the system about its mass center G. Express the results in the X', Y', and Z shaft-fixed directions. (b) Find K the kinetic energy of the system.



3) The system shown consists of bar B pinned through the center of a shaft of length $2a$. As the shaft rotates about the Z-axis at a rate Ω (r/s), B rotates about the Y-axis (normal to the plane of the diagram) at a rate $\dot{\theta} = \omega$ (rad/s). (a) Find $\underset{\sim}{H}_G$ the angular momentum of B about its mass center G. Express the results in the X', Y', and Z shaft-fixed directions. (b) Find K the kinetic energy of B.



4) The system shown consists of a bar B that is pinned to the bottom of a disk D. As the disk rotates at a rate Ω (rad/sec) about the Z-axis, the bar rotates at a rate $\dot{\theta}$ (rad/sec) about the X' direction (normal to the plane of the diagram). (a) Find $\underset{\sim}{H}_G$ the angular momentum of B about its mass-center G. Express the results in the X', Y', and Z disk-fixed directions. (b) Find K the kinetic energy of B.