# Class exercise

## Simulation and Modeling (CSCI 3010U)

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## 2D Rigid Body

This code simulates a 2D box. To keep things simple, the mass is set to 1.0, and the inertia tensor (in the body coordinate frame) is set to identity. This is a 2D simulation and we assume that the z-axis is coming out of the screen. A force acts on the center of mass of the box in the $xy$-plane, and a torque acts on the box in the counter-clockwise direction about the $z$-axis.

As discussed in the lecture, the state of this box is represented by its position, rotation, linear and angular momentum. We store the state in `state` vector.

Complete the `f(self, t, state, force, torque, IbodyInv)` function in the code provided on the course website. This function is called `f` by the ode solver, and it sets up the right-hand-side of the differential equations describing the state variables.

### Code

Available on the course website.

### Submission

The exercise will be completed in class, and you do not need to submit anything. **Be prepared to show your work to the instructor**.