

In this homework, you will create an interactive WebGL demo of model and view transformations of a 3D object. You can use the provided code skeleton and fill in the places marked with "todo", or create your own solution.

You can look at code examples online, but do not use other 3D libraries. (Hint: Look at methods provided in MVnew.js.)

## 1 Controlling the cube and camera

Draw a cube and define controls for the world frame and the camera frame. For simplicity, assume that at the beginning the cube's center is at the origin, the cube's side length is 1, and the camera is at (0,0,1) pointing towards the negative z direction, and the camera's up direction is the positive y direction. There should be controls in the web page to change the x, y and z coordinates of the camera's position, and at least two rotation axes of your choice for the cube. You can use sliders, keys, and/or mouse movement and scrolling for the controls (but not buttons or text inputs which would be very inconvenient). Label or explain your controls in your web page.

To make the transformations clearly visible, you should use different colors in the cube like the examples provided in the lecture.

Experiment with the controls. Notice when parts of the cube aren't visible, and think about why.

## 2 Looking at the cube

Add controls for the camera's orientation to switch between looking at the cube's center and looking in the default direction, without changing the camera's position. Label or explain your controls in your web page.

## 3 Extra credit

Add perspective and orthographic camera projections to the demo. You can choose the parameters of the projections to make them look good. Add a button or another way to switch between perspective and orthographic camera modes without changing the camera's position and orientation.