Student's ***NetID***_____Student's Name_____Grader's ***NetID***_____
(netID == 3 letters, 3 digits: e.g. JET861 Please write clearly; make it easy to read)

EECS 351-1 Grading Sheet: Project B Fall 2019

J. Tumblin 11/04/2019

_____**10% All file-naming correct (2pts) + clear illustrated PDF report(5pts)** with name, netID, title, goals, user-guide, ≥4 results pictures + **correct** sketch of your program's scene-graph showing all its transforms (3pts).

_____ **5% User Instructions:** Program's on-screen display allows new users to quickly and easily identify and use all the programs features and options, without any extra help from source code, report, or authors' explanations.

_____**10% Ground-Plane Grid:** Project shows horizontal 'floor' of repeated shapes or lines that extend nearly endlessly to all distant horizons, and thus let us easily assess changes to camera position and aiming direction. In the world coordinate system where +z is 'up', the ground plane at z=0 spans x,y coords that appear horizontal on-screen.

_____**10% Animated, adjustable 3-Jointed, 4-Segment Shape**: draws at least one shape of at least 4 parts connected by 3 or more sequential joints that move smoothly. Joint adjustments MUST NOT CHANGE any cameras or any views, and viewing adjustments and camera pose adjustments must not change any joints of your objects.

_____**10% 4 or more Additional Multi-color 3D Shapes placed on ground plane.** Each with at least 3 different vertex colors specified, these items create an interesting 'world' to explore (fixed, non-jointed objects OK…)

_____ **5% Draw 3D Axes (r,g,b == x,y,z):** Draws 3D **world-space** coord. axes on-screen, and at least one more set of 3D axes to depict the coordinate system used for a rotatable joint or movable part in the jointed object.

_____**10% Mouse-Drag Quaternion Rotations of 3D part.** At least one 3D part or shape positioned on ground-plane responds to mouse-dragging by quaternion rotation. Successive mouse-drags correctly accumulate rotations.

_____**5% Mouse-Drag Rotations work correctly at all viewpoints.** On-screen rotation axes for the 3D part always appears to be perpendicular to the mouse-drag directions, regardless of camera position.

_____**10% 2 Side-by-Side Viewports** Divides entire browser window evenly into two (2) viewports that always fill entire window width and exactly 80% (4/5ths) of the window height, yet will never squash/stretch contents as users re-size window for taller or wider images of any size. Browser resizing should NEVER invoke browser slider-bars!

_____**10% Perspective Camera** with 40-degree vertical field-of-view (top-to-bottom) in left viewport, **AND Orthographic Camera** in right viewport; same eye-point, 'look-at' point, 'up' vector, 'z-near' and 'z-far' for both. Orthographic camera width, height must match perspective camera's view-frustum size measured at z = (far-near)/3.

_____**15% Smoothly adjustable 3D View Control:** User interaction provides smoothly adjustable, unrestricted viewpoint control: be able to aim camera in any direction without changing position: be able to move forward/ backward in the gaze direction, and 'strafe' sideways left/right from any 3D position; (e.g. 'glass cylinder' or 'ball')

==========

_____2% extra credit: user adjustable asymmetric camera; make all 6 frustum parameters individually user-adjustable (left, right, top, bottom, left, right adjustments) with on-screen edit-boxes to enter numbers.

_____4% extra credit: User can switch Perspective camera to show view from the end segment of the animated 4-segment shape. For a robot arm, attach the camera to the robot's finger, aimed where the finger points as it moves.

_____2% extra credit: 'flying-airplane' navigation controls: forward velocity; aiming by roll, pitch, yaw…

==========**TOTAL POINTS/100** (24% of final grade)