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 Win 2018

J. Tumblin 2/07/2018

_____**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.

_____**15% Simple Diffuse Overhead Shading.** At least one moving 3D shape shows orientation-dependent on-screen vertex colors, smoothly interpolated between vertices. Compute each vertex color from the dot-product of surface normal and the world-space +z vector in your Vertex Shader program: see Assignment Sheet.

_____**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 35-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; (HINT: 'glass cylinder' method).

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_____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.

_____2% 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…

_____2% extra credit: quanternion-based 'trackball' control of orientation for at least one on-screen object. Mouse dragging must change the on-screen orientation of the object as if it were enclosed in an invisible sphere that we rotate by 'dragging' its surface with the mouse, and must not exhibit gimbal lock or any drag-direction errors.

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