MECE 4606 DIGITAL MANUFACTURING

Prof. Hod Lipson

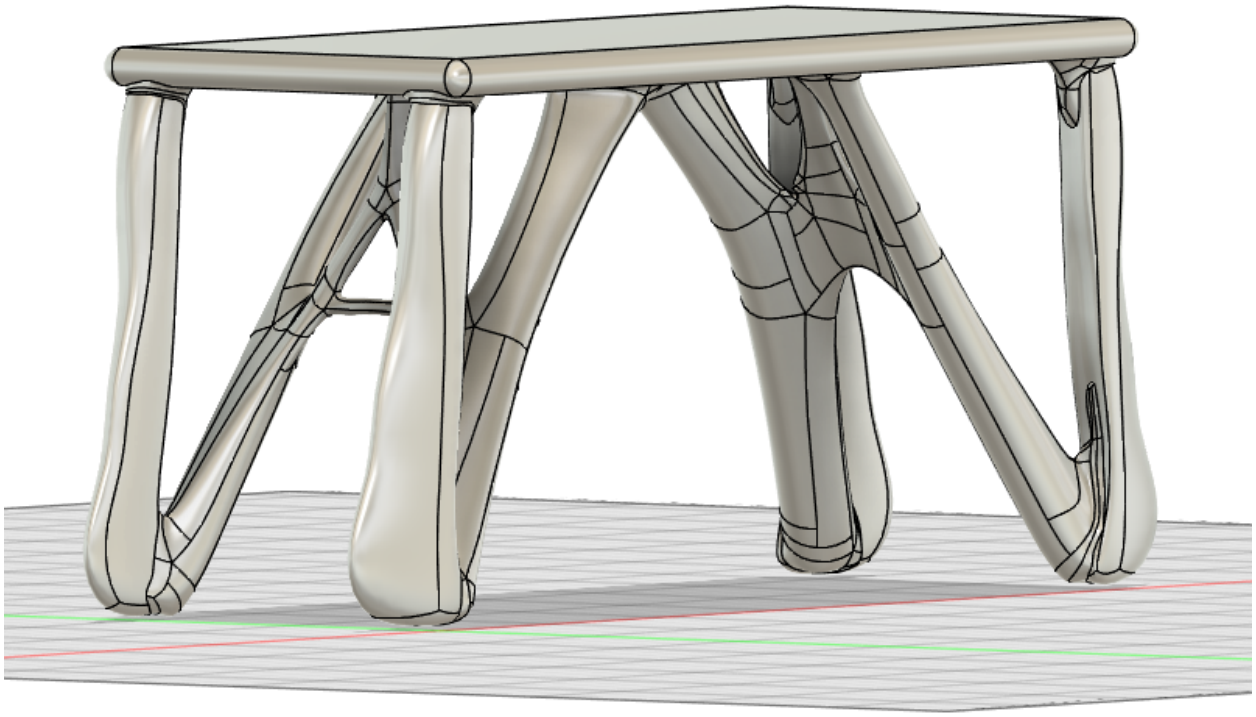
Topology Optimization

Brock Taylor (btt2115)

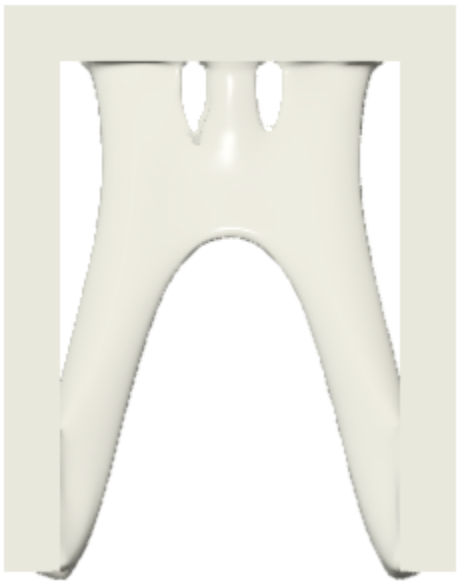
April 6: 11:59am

(Made with Autodesk Fusion 360)

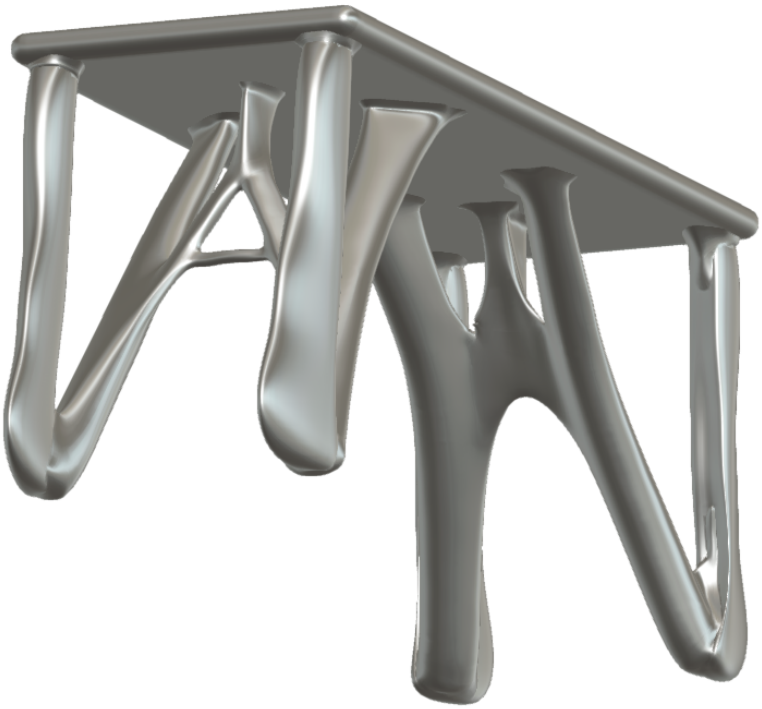
124.5 Grace Hours Before Submission, -60 Hours Used, 64.5 Hours After Submission



II. Draft Design-Desk (submitted one week prior to deadline)

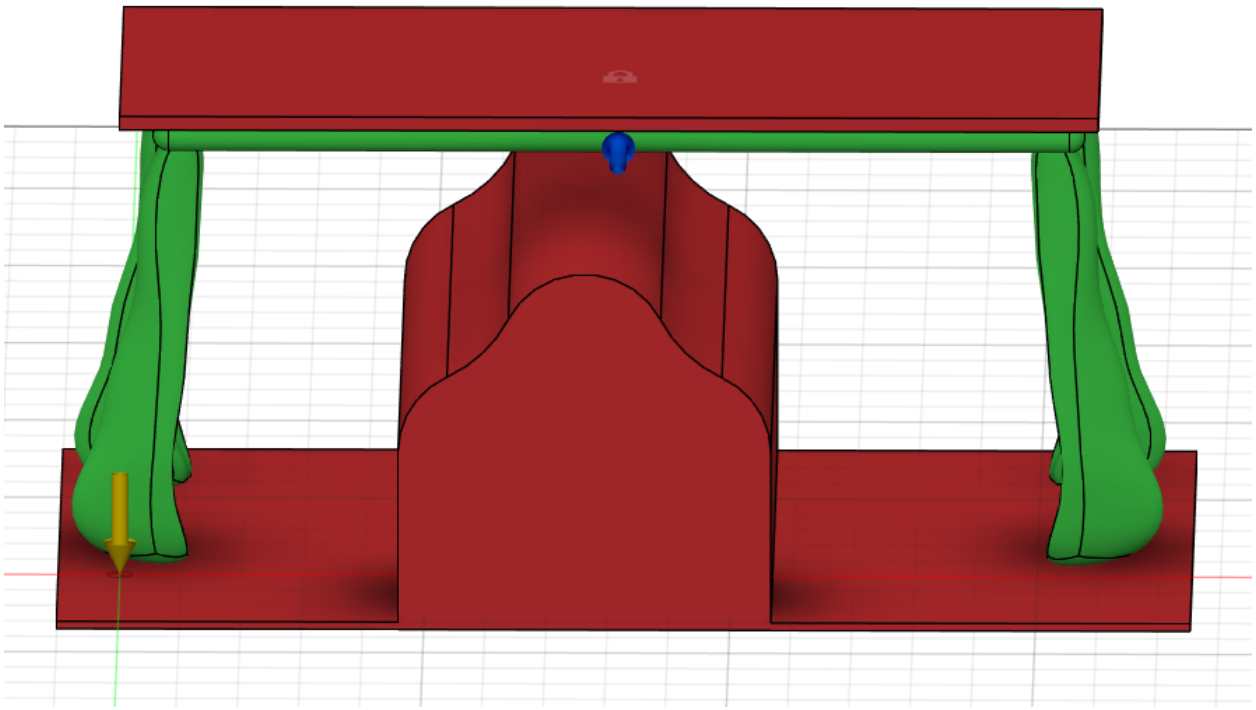


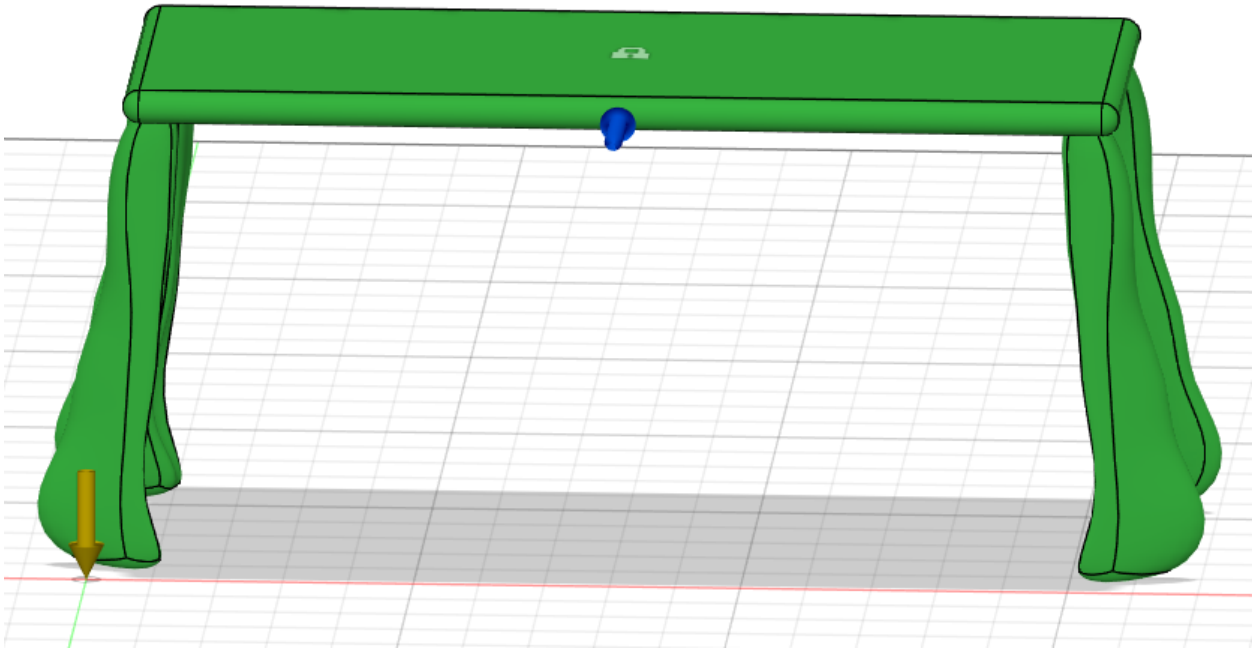
III. Desk Design (Final)



Calculated weight (from Autodesk): 96.29 kg

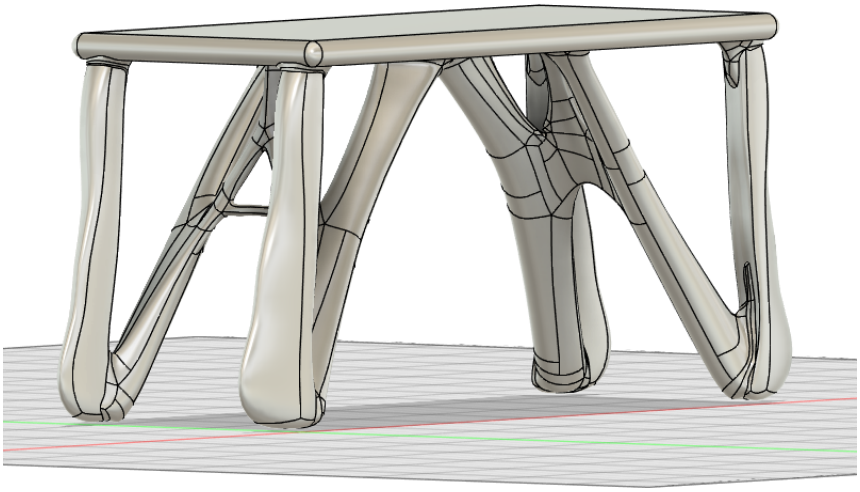
III.a Design Specifications



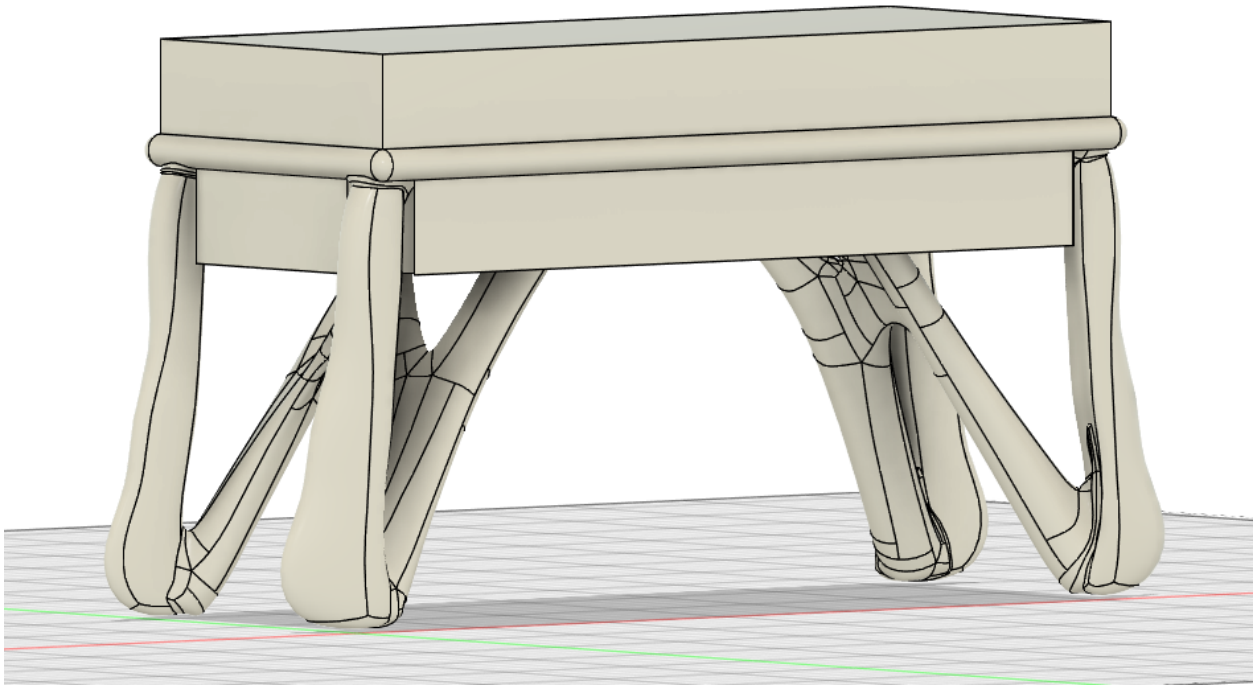


Green: preserve geometry
Red: obstacle geometry.
The red obstacle geometry was placed to prevent the optimization software from filling in spaces that should be left alone such as the tabletop itself. For load cases, I specified one case for force on the tabletop and one case for each side of the table. The forces specified were 200 lbs for the tabletop and 50 lbs for each side. Additionally, all load cases accounted for gravity.

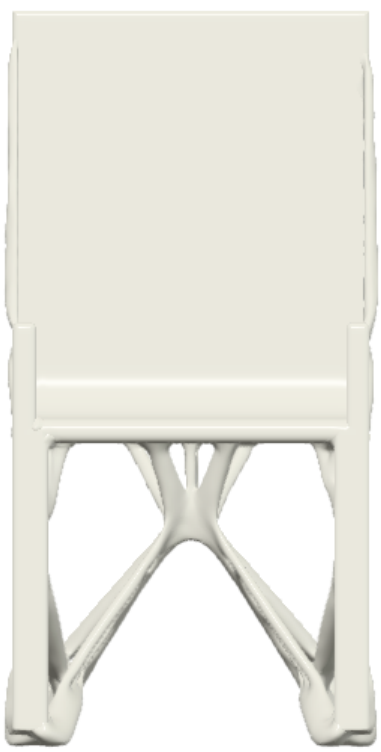
III.b Exported Part

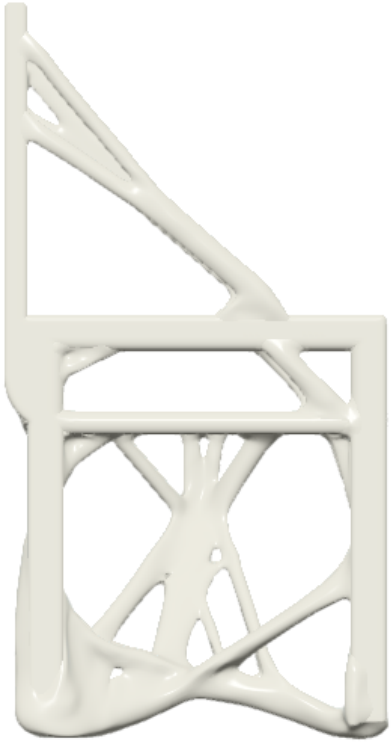


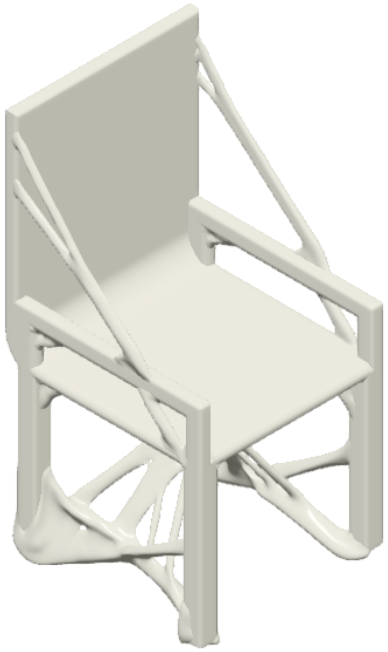
Additional Features (demonstrating working CAD model):



IV Chair Design

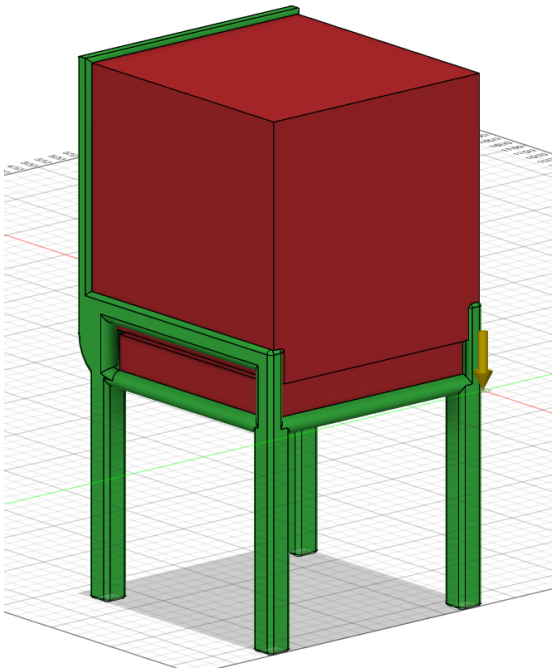


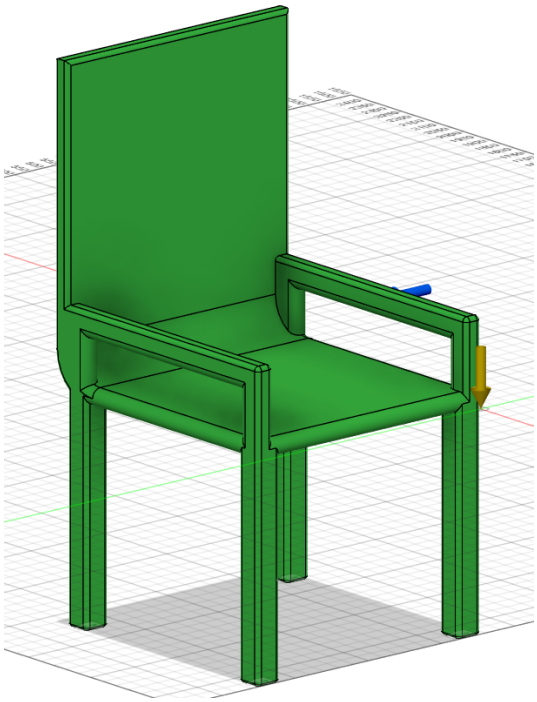




Calculated weight (from Autodesk): 114 kg

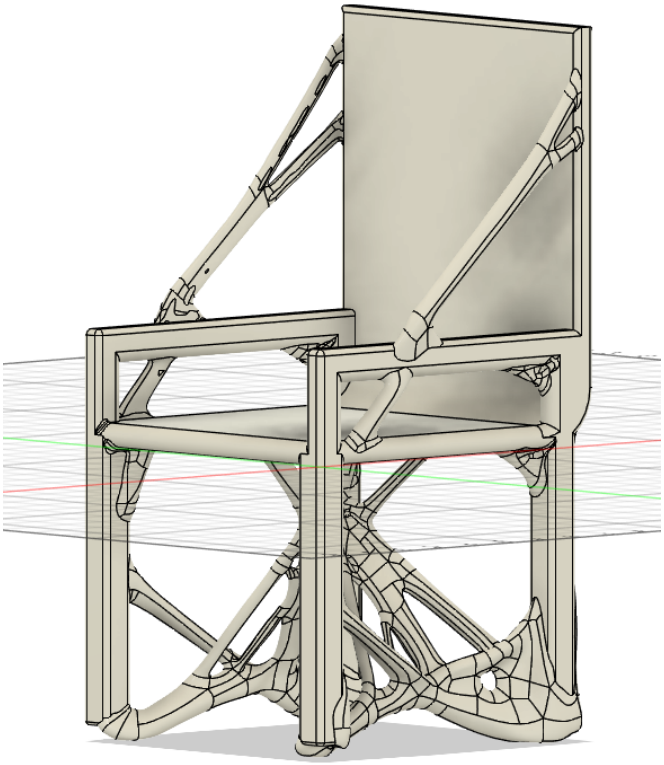
IV.a Design Specifications



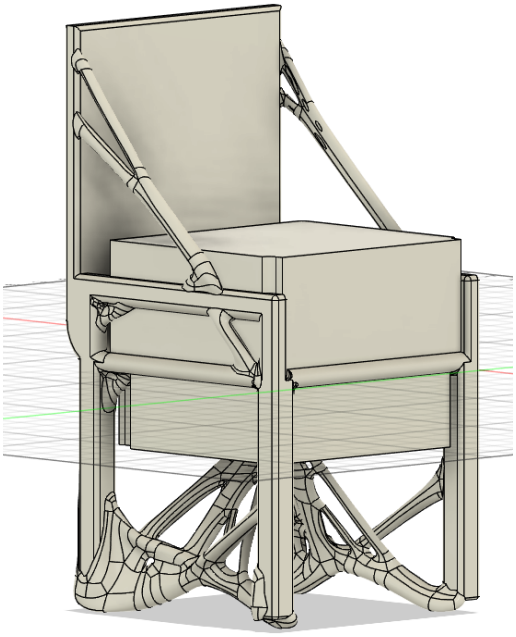


Green: preserve geometry
Red: obstacle geometry
Originally, I had not used obstacle geometry for this design. However, the generative software placed supports from the back of the chair to the top face, which would have prevented anyone from sitting in it. Obstacle geometry was used to prevent the software from filling in space where someone would occupy while sitting.

IV.b Exported Part



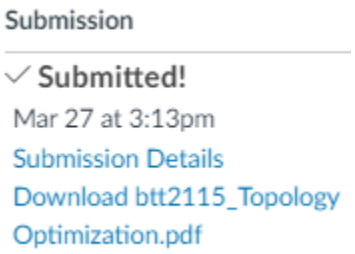
Additional Features (demonstrating working CAD model):



V Image Rendering

VI Rubrics Attempted

1. 10pts Cover page correct and complete
2. 10pts Report neatly organized and formatted
3. 10pts Initial desk design submitted a week before the deadline (show screenshot)



4. 10pt Desk – Reasonable specifications described in a diagram
5. 10pt Desk – Three screenshots provided
6. 10pt Desk – Weight calculated
7. 10pt Chair – Reasonable specifications described in a diagram
8. 10pt Chair – Three screenshots provided
9. 10pt Chair – Weight calculated
11. 10pt Rendering of desk and chair photorealistic in real context

16. 10pt Final design exported back into conventional CAD where additional features are added to the CAD model to demonstrate that the CAD model is functional.

Total = 110 points