24-681: Computer-Aided Design

Carnegie Mellon University

PS 6

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Due:	**3/19/2021 (Fri) 5:00 PM @ BOX**
Issued:	3/9/2021 (Tue)
Weight:	4% of total grade
Note:	Attach to your scanned paper submission the cover page included at the end of this document.

PS6-1 'Zebra' reflection pattern generation

In this problem, you are going to write a computer code that generates a zebra reflection pattern given:

(1) a geometry file that represents a polygonal surface

(2) a viewpoint

(3) a zebra pattern plane

(4) a zebra pattern direction, line thickness, and line spacing

The automobile industry uses the zebra reflection pattern intensively, both in a physical prototyping and computer simulation, to evaluate the style design of a car. The two pictures below show computer simulated images of a zebra pattern. Also shown are zebra reflection patterns of a bi-cubic polynomial surface and a scanned face.
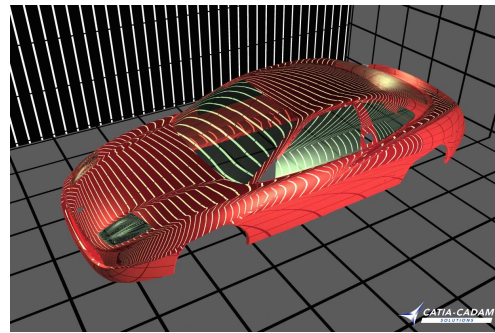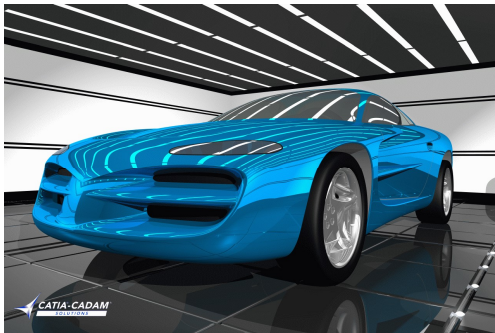
Write a computer program that takes as input:

(1) a data file of a polygonal surface in an ASCII format,

(2) a viewpoint position, $\mathbf{e}$,

(3) three vectors that define a zebra board plane, $\mathbf{p}_0$, $\mathbf{a}$, and $\mathbf{b}$
($\mathbf{a}$ and $\mathbf{b}$ are unit orthogonal vectors that specify the direction of zebra pattern), and

(4) a line thickness, d_w, and a line spacing, d_b

and generates a VRML file that shows the polygonal surface with a zebra reflection pattern. Apply your code to your face data and the three polygonal surface files posted on the class web: surface.grd, face.grd, car-panel1.grd, car-panel2.grd.

In your hand-in directory on BOX, make a new directory called ps6 (in lower case), and hand in:

o source code

o executable

o output VRML files

o "readme.txt" file that explains how to run your code

Also hand in a scanned pdf file of the following (add the coverpage included at the end of this document) :

o explanation of your method (describe how to determine the color of each node using $\mathbf{p}_{ij}$, $\mathbf{e}$, $\mathbf{p}_0$, $\mathbf{a}$, $\mathbf{b}$, d_w, and d_b)

o a screen shot of each of the polygonal surface with a zebra reflection pattern
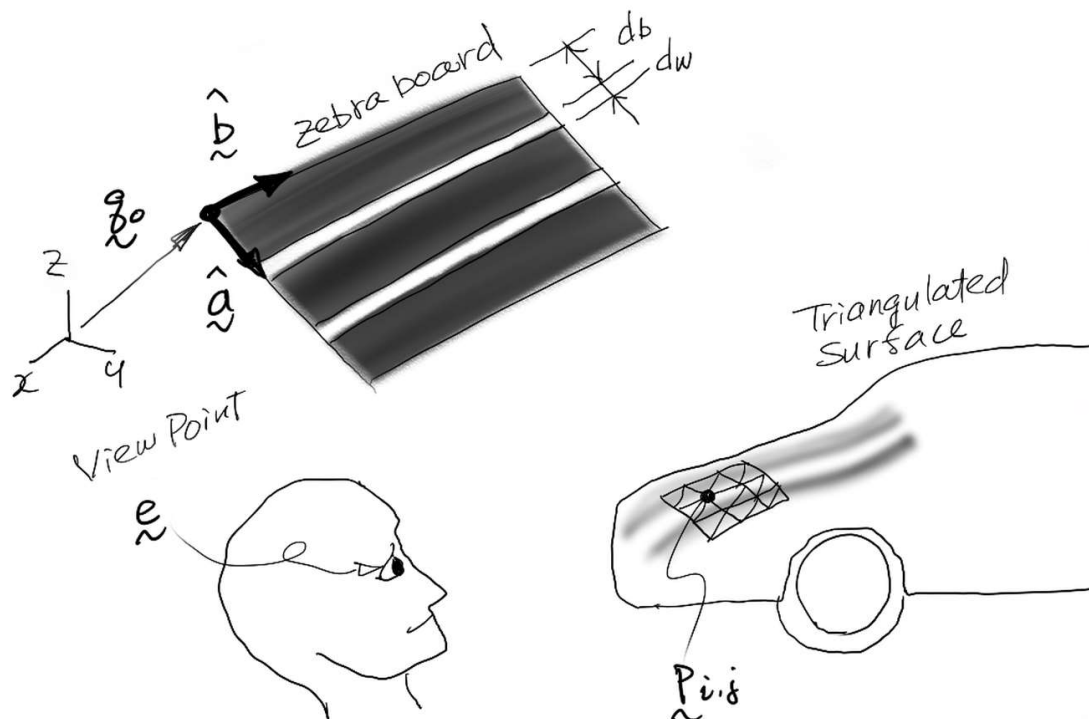
PS6

The first letter of
your LAST name

_____   _____
First Name   Last Name

How many hours did you spend to complete this problem set?   **_____ Hours**

How many no-penalty late days do you want to use for this problem set? _____ Day(s)

24-681   COMPUTER-AIDED DESIGN   Spring 2021

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PROBLEM SET 6

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