Sample Test 3a: Surfaces, Textures
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April 12, 2023

– State any simple, reasonable assumption used to arrive at your answer.
– A 'yes' or 'no' answer without reasoning is worth 0 points.
– Zero points if the writing is hard to decipher. Use a black pen if in doubt.
– Indicate with arrow if you use the back of the previous page (last page for page 1).

1 Surface Patches

A patch $\mathbf{p}$ in Bernstein-Bézier form has coefficients

$$\begin{bmatrix} 0 \\ 2 \\ 0 \end{bmatrix} \quad \begin{bmatrix} 2 \\ 2 \\ 0 \end{bmatrix}$$

$$\begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix} \quad \begin{bmatrix} 2 \\ 0 \\ 2 \end{bmatrix}$$

1. What is the degree? (1/2 point)

2. evaluate $\mathbf{p}$ at $u = v = 0.5$ using DeCastejau's algorithm. (1 point)

3. compute the normal $\mathbf{p}$ at $u = v = 0.5$. (1 point)

4. A second patch in Bézier form has coefficients

$$\begin{bmatrix} 2 \\ 2 \\ b \end{bmatrix} \quad \begin{bmatrix} 0 \\ 2 \\ 0 \end{bmatrix}$$

$$\begin{bmatrix} 2 \\ 0 \\ c \end{bmatrix} \quad \begin{bmatrix} a \\ 0 \\ 0 \end{bmatrix}$$

Determine a,b and c so that the two patches join smoothly. (1.5 points)
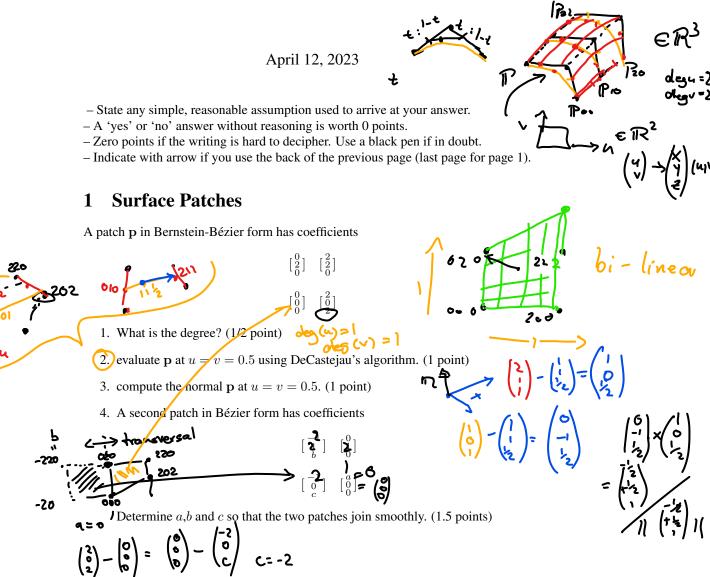
1

IMPROVE?

2 Texture Mapping

([3] points) Generalized subdivision algorithms, such as 'subd' in 'blender' work by repeatedly cutting off (sharp) edges and refining the polyhedron. How would you texture map a subdivision surface? That is, what is a good choice of texture coordinates?

distortion
happens when
no straight lines
are embedalable
on the surface

flatten
in pieces

charts
atlas

texture
coordinate

texture

nearest
average

0t

t

00   s   10

clamp

1.2   repeat

x
y
z

v

u

s,t