d2020-2021

Question 1:

(a).

(i) c

(ii) a

(iii) e

(iv)

(A) 3 elements (the vertices)

(B) 225 (number of pixels) I put 29 since these are the pixels with majority in the triangle?

(v)

(A) 4

(B) 256 (16 x 16, number of pixels in quad)

(b)

(i) V(7,7) = (-1/15, -1/15, -1)

(ii) V(3,3) = (-3/5, -3/5, -1)

(iii)

(iv)

(v)

(c )

(i) soft shadows, global illumination, refractions, diffraction, reflections?

(ii) Soft shadows can be drawn by randomly sampling multiple shadow rays from any given point towards an area light source. Illumination can then be done based on the proportion of shadow rays reaching the light source.

(iii)

A: 0%, e:2/3, j: 1/3

(iv)

More shadows rays and thus more intersection checks. Computationally expensive.

(v) Self-shadowing occurs when the intersection point of the ray is calculated to be inside the object due to precision problems. The shadow ray originating from that point intersects the object itself and is falsely considered to be occluded from the light source. A corrective measure would be to move in the direction of the surface normal by a small epsilon magnitude from the calculated intersection point to offset the precision problems.

(vi) ray depth, threshold, ray exits scene.

Updated: I think no material. If all the materials are reflective then the trace never ends.

(vii) all?

(viii) 16 x 16 – 9 x 11

(ix)

[16 x 16 x 4 - (16 x 16 x 1 + 9 x 11 x 4)]/[16 x 16 x 4]

Question 2:

(a) - most parts are included in 2017-2018 Q4

(i)

(A)

(B)

(C)

(ii)

(iii)

(A)

(B)

(iv)

(b) 2018-19 Q2

(i)

(ii)

(iii)

(iv)

(v)

(vi)

(c ) 2015-16 Q1

(i)

(ii)

M1 = [[0.6, 0.2, 0.1],

[0.3, 0.6, 0.1],

[0.1, 0.2, 0.8]]

(iii)

(iv)