Computer Graphics - Excercise 2

3.1.1

(a)

The more obtuse the triangle, the more acute the angle of the corner of the voronoi area gets. Because the both sides of this corner has to be in a 90° angle to the sides of the traingle.

(b)

The formula for calculating the surface of a triangle is: $\frac{1}{2} * h * b$ As for the red triangle: $\frac{1}{2} * h * b$ with: $h = \frac{||p_i - p_j||}{2}$ and $b = b_1 + b_2$ where b_1 is left part of the baseline facing α_{ij} and b_2 is the right one facing β_{ij}.

(c)

3.1.2

(a)

We know every vertex(v) has three edges(e) and 2 faces(f). In addition every edge(e) can separated into two half edges (e_h), this means $e_h = 2 * e = 6 * v$.
If we add the memory for every part it results in a formula:

$$\begin{aligned} \text{memory} &= v * 16\text{bytes} + e * 4\text{bytes} + e_h * 16\text{bytes} + f * 4\text{bytes} \\ &\rightarrow \text{through assumptions:} \\ \text{memory} &= v * (16 + 3 * 4 + 6 * 16 + 2 * 4)\text{bytes} = v * 132\text{bytes} \end{aligned}$$

(b)

Because in a quad mash two triangles are combined into one quad, the resulting faces will be reduced by a half. The resulting ratio will be 1:3:1 (for v : e : f)

(c)

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If we add the memory for every part it results in a formula:

$$\begin{aligned} \text{memory} &= v * 16\text{bytes} + e * 4\text{bytes} + e_h * 16\text{bytes} + f * 4\text{bytes} \\ &\rightarrow \text{through assumptions:} \\ \text{memory} &= v * (16 + 3 * 4 + 6 * 16 + 1 * 4)\text{bytes} = v * 132\text{bytes} \end{aligned}$$