CS4815 **Week11 Tutorial**

1. In recent lectures we spoke about computing *vertex* normals by taking the "average" of the normals of all polygons incident to the vertex. We then suggested two refinements of this by applying a weighting to each normal so that some would be more important than others. Then if a vertex v had incident polygons $p_1, \ldots, p_n$ with normals $\mathbf{N}_1 = \mathbf{n}_1/|\mathbf{n}_1|, \ldots, \mathbf{N}_n = \mathbf{n}_n/|\mathbf{n}_n|$, respectively, we would replace the vertex normal calculations

$$\mathbf{n}_v = \frac{1}{n}\sum_{i=1}^{n} \mathbf{N}_i$$

and (after normalizing)

$$\mathbf{N}_v = \frac{\mathbf{n}_v}{|\mathbf{n}_v|} = \frac{1}{n}\sum_{i=1}^{n} \mathbf{N}_i \times \frac{n}{|\sum_{i=1}^{n} \mathbf{N}_i|}$$

with

$$\mathbf{n}_v = \sum_{i=1}^{n} w_i \mathbf{N}_i$$

where w_i is a weighting term. The two weights we mentioned were:

- w_i is the area of p_i
- w_i is the angle of the two sides of p_i at v_i

Show how to compute these two weighting functions.