CS 430 Homework 5

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1. **Normals**

   For the polygons normal use either one of the vertex normals or interpolate (or average) them.
   I chose to use one vertex normal as the polygon normal.

   $A = (1, 1, 1)$
   $B = (5, 1, 1)$
   $C = (2, 3, -2)$

   $AB = (5, 1, 1) - (1, 1, 1) = (4, 0, 0)$
   $AC = (2, 3, -2) - (1, 1, 1) = (1, 2, -3)$

   $D = AB \times AC$
   $= ((0)(-3) - (2)(0), (4)(-3) - (1)(0), (4)(2) - (1)(0))$
   $= ((0 - 0), -(-12 - 0), (8 - 0)) = (0, 12, 8)$

   length $= |D| = \sqrt{0^2 + 12^2 + 8^2} = \sqrt{0 + 144 + 64} = \sqrt{208} = 4\sqrt{13}$

   normal $= \frac{D}{|D|} = (\frac{0}{4\sqrt{13}}, \frac{12}{4\sqrt{13}}, \frac{8}{4\sqrt{13}}) = (0, \frac{3}{\sqrt{13}}, \frac{2}{\sqrt{13}})$