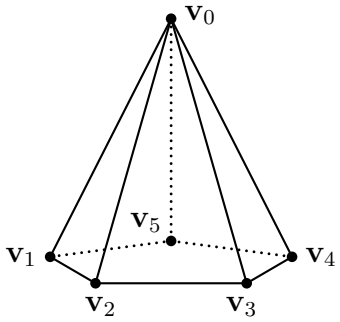
Math 155A - Spring 2022 - Quiz #1 - March 31

Name: Answer Key

PID:

1. A five sided pyramid has vertex $\mathbf{v}_0$ at its apex, and vertices $\mathbf{v}_1 - \mathbf{v}_5$ around its base. For the next problems, give answers that make the triangles' front faces face ***outward***. For questions (b) and (c), it will be necessary to render the base by breaking into three triangles. For this, the faces on the base will be facing *downward* in order to facing outward.

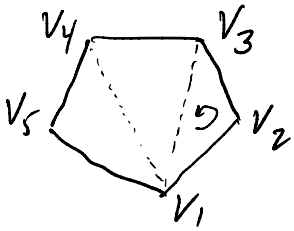


(a) Give an ordering of the vertices that will enable rendering the upper five faces of the pyramid as a single triangle fan (GL_TRIANGLE_FAN).

Answer: $v_0, v_1, v_2, v_3, v_4, v_5, v_1$

The final v_1 is needed to get the final (fifth) triangle.
It is also possible to replace the cycle $v_1, \ldots, v_1$ with starting at another v_i $(i = 2, \ldots, 5)$

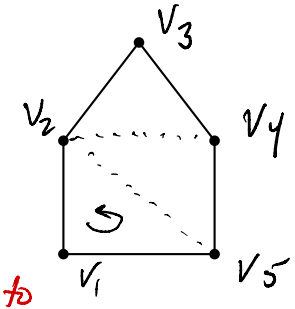
(b) Give an ordering of the vertices that will enable rendering the base of the pyramid as a single triangle fan (GL_TRIANGLE_FAN). [Hint: use one of the base vertices as the center of the triangle fan.]



Answer: v_1, v_5, v_4, v_3, v_2

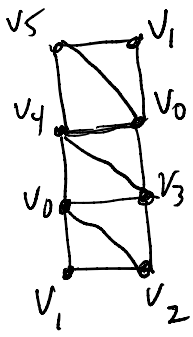
(or a cyclic permutation of this)

(c) Give an ordering of the vertices that will enable rendering the upper five faces of the pyramid as a single triangle string (GL_TRIANGLE_STRIP). [Hint: It is probably useful to think of the five face vertices as being laid out in the topologically equivalent shape pictured to the right.]

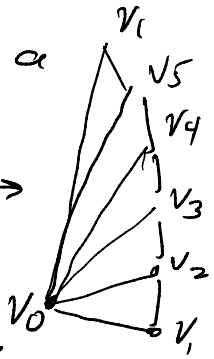


Typo in problem statement: Intended to ask for rendering the base.

Answer #1: Rendering the base as a triangle strip:
v_1, v_5, v_2, v_4, v_3 (Other answers are possible.



Answer #2: Rendering the top 5 triangles as a triangle strip with degenerate triangles:
$v_0, v_1, v_0, v_2, v_0, v_3, v_0, v_4, v_0, v_5, v_0, v_6$



or

$v_1, v_2, v_0, v_3, v_4, v_0, v_5, v_1$ but the problem with this last answer is that last 3 triangles face the wrong way.