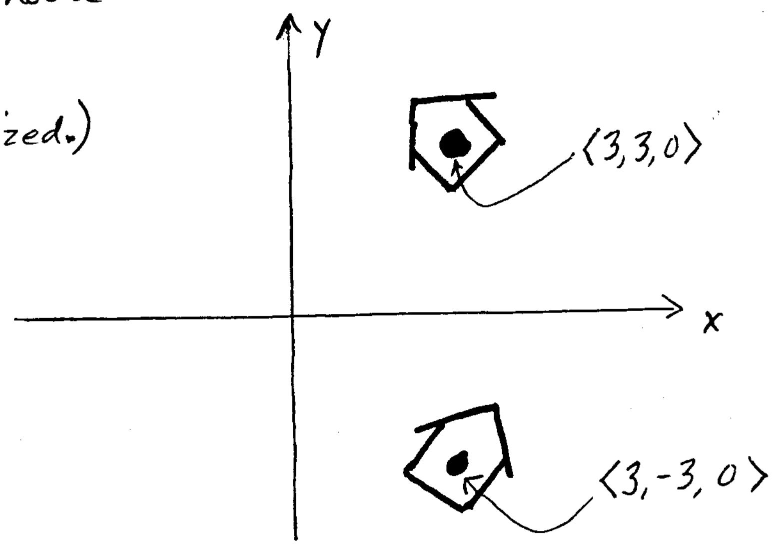
Name: ____________

3 Suppose the "drawHouse()" command draws the picture  with center point at the origin ⟨0,0,0⟩, lying in the xy-plane, and upright so the roof points up the y-axis. Give the sequence of OpenGL commands (such as glLoadIdentity, glRotatef, glTranslate3f, glPushMatrix, glPopMatrix, glLoadMatrix) which draws two houses placed as shown. Both houses are tilted 45° and lie in the xy-plane.

(The houses are not resized.)



Name: ____________

4. Describe environment mapping.

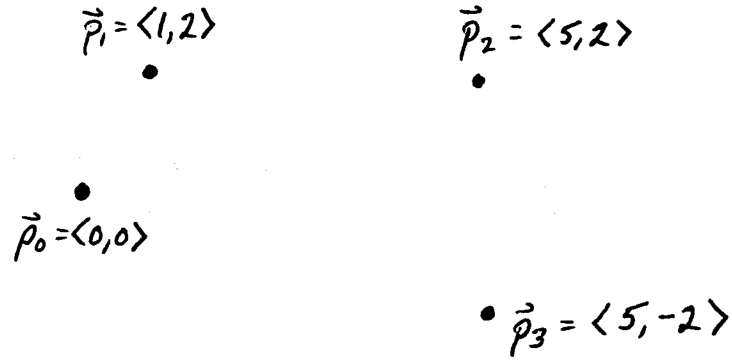
What is it? What is its purpose? How is it used?

It what ways can the data in an environment map stored?

What kind of calculations are needed to apply an environment map to a surface?

Name: ____________

7. A degree three Bézier curve has control points $\vec{p}_0, \vec{p}_1, \vec{p}_2, \vec{p}_3$ as shown.



(a) Draw the Bézier curve $\vec{q}(u)$ above.

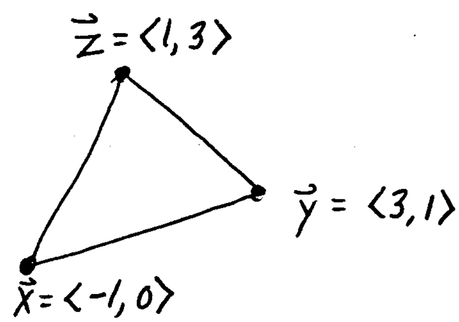
(b) What are $\vec{q}(0)$, $\vec{q}(1)$, $\vec{q}\,'(0)$, $\vec{q}\,'(1)$? (Give numeric values.)

(c) Compute $q(1/2)$.

Name: ____________

#6 Let $\vec{x} = \langle -1,0 \rangle$, $\vec{y} = \langle 3,1 \rangle$, $\vec{z} = \langle 1,3 \rangle$ in $\mathbb{R}^2$.

(a) What point in $\mathbb{R}^2$ has barycentric coordinates $a = \frac{1}{2}$, $b = \frac{1}{3}$, $c = \frac{1}{6}$



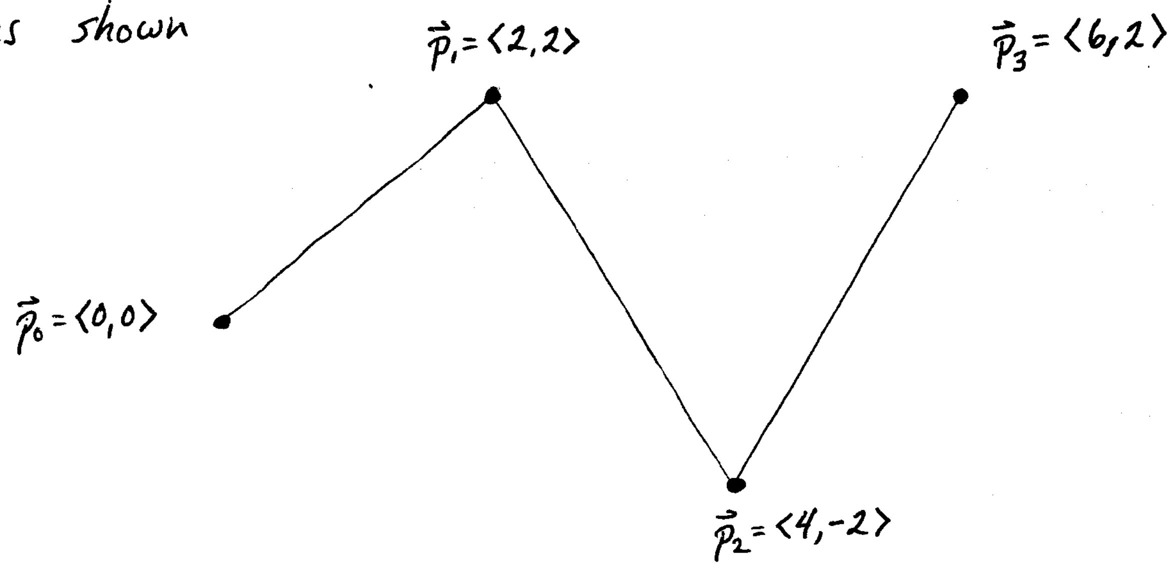
(b) What are the barycentric coordinates of $\langle 3,1 \rangle$?

(c) What are the barycentric coordinates of $\langle 0, 1/4 \rangle$?

(d) What are the barycentric coordinates of $\langle 2,1 \rangle$?

Name: ______________

8. A degree three Bézier curve $\vec{q}(u)$ has control points $\vec{p}_0, \vec{p}_1, \vec{p}_2, \vec{p}_3$ as shown



(a) Find the control points for two degree 3 Bézier curves $\vec{q}_1(u)$, $\vec{q}_2(u)$ such that

$$\vec{q}_1(u) = \vec{q}(u/2) \qquad 0 \le u \le 1$$
$$\vec{q}_2(u) = \vec{q}(u/2 + 1/2) \qquad 0 \le u \le 1.$$

Draw the points on the picture above and give their numeric values.

(b) Draw the curve $\vec{q}(u)$ on the figure above. Be sure to show where the curve interpolates (contains) control points, and to show tangencies as appropriate.