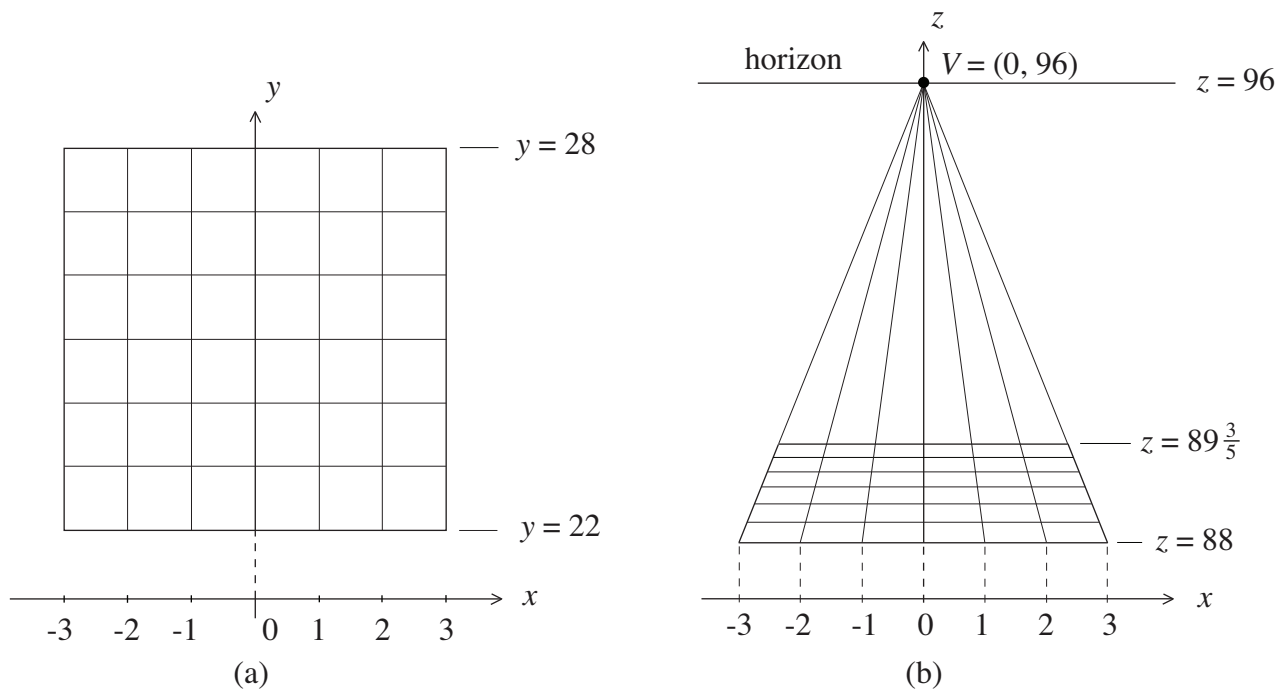**Quiz 9. April 20, 2011.   Name**

Preamble: Figure (a) depicts Alberti's floor in the x-y plane (the unit of length is the foot). Figure (b) depicts the perspective image of the floor as drawn by an artist on a canvas in the x-z plane (with the unit of length the inch). Alberti's instruction to the artist, expressed within the framework of

$y = 28$

$y = 22$

z

horizon $V = (0, 96)$ $z = 96$

$z = 89\frac{3}{5}$

$z = 88$

(a)   (b)

the given coordinate systems, is this rule: A point P with coordinates $P = (x_0, y_0)$ at any location in the x-y plane (the unit of length here is the foot) with positive y-coordinate should be drawn at the point

$$Q = (x_1, z_1), \text{ where } x_1 = 12\frac{2x_0}{2+y_0} \text{ and } z_1 = 12\frac{8y_0}{2+y_0},$$

in the x-z plane of the canvas (the unit of length here is the inch).

1. Let c be a constant and consider the line $y = 22 + 8(x - c)$ in the x-y plane. Take c to be some random number between -3 and 3 and sketch the line on the x-y plane provided above. Check that the point $P = (\frac{t-22}{8} + c, t)$ is on the line for any positive t. Consider the perspective image Q of P in the x-z plane and determine its coordinates by using Alberti's instruction.

2. A small bug crawls on the floor along the line $y = 22 + 8(x - c)$ in the direction of the positive y-axis. Every minute or so, the artist draws the bug in perspective on his canvas. The artist notices that the points representing the bug are converging to a point on the canvas. What is this point? (Answer by first rewriting the coordinates of Q appropriately).