Written Problem 1.

(a) $x(t) = x_1 t + x_0$
$y(t) = y_1 t + y_0$
$z(t) = z_1 t + z_0$

(b) $u = \frac{fx}{z}$, $v = \frac{fy}{z}$
$u = \frac{f\cdot(x_1 t + x_0)}{z_1 t + z_0}$, $v = \frac{f\cdot(y_1 t + y_0)}{z_1 t + z_0}$

(c) Solving for t (showing process for only u),
$u(z_1 t + z_0) = f(x_1 t + x_0)$
$uz_1 t + uz_0 = fx_1 t + fx_0$
$t(uz_1 - fx_1) = fx_0 - uz_0$
$t = \frac{fy_0 - vz_0}{vz_1 - fy_1}$

Result for v (follows same process),
$t = \frac{fx_0 - uz_0}{uz_1 - fx_1}$

Setting equal,
$\frac{fy_0 - vz_0}{vz_1 - fy_1} = \frac{fx_0 - uz_0}{uz_1 - fx_1}$
$(fy_0 - vz_0)(uz_1 - fx_1) = (fx_0 - uz_0)(vz_1 - fy_1)$
$fy_0 uz_1 - vz_0 uz_1 - fy_0 fx_1 + fx_1 vz_0 = fx_0 vz_1 - uz_0 vz_1 - fx_0 fy_1 + fy_1 uz_0$

Eliminating like terms,
$fy_0 uz_1 - fy_0 fx_1 + fx_1 vz_0 = fx_0 vz_1 - fx_0 fy_1 + fy_1 uz_0$

Rearranging into implicit form ($ax + by + c = 0$),
$(y_0 z_1 - y_1 z_0)fu + (x_1 z_0 - x_0 z_1)fv + (y_0 x_1 - x_0 y_1)f^2 = 0$

In this case, implicit form in image coordinates would be $au + bv + c = 0$.
Therefore, a straight line in the world projects onto a straight line in the image.

(d) Since there is 'no' z-axis (camera is lying on z-axis), a line on or parallel to the z-axis would appear as a dot to the viewer.

Here we can set x and y values to 0 to eliminate the line's dependence on them,
$0 \cdot fu + 0 \cdot fv + 0 \cdot f^2 = 0$