Assignment 13 Problem One

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1. For each of the parametric equations and parameter intervals given below:
(a) Sketch the curve using the parametric equations. Indicate the direction.
(b) Rewrite the parametric equations as a Cartesian one. State the domain.
(a)
$x = \sqrt{t+1}$
$t = x^2 - 1$
$y = \sqrt{t}$
$t = y^2$
$y = \sqrt{x^2 - 1}$
Because $t \geq 0 \implies x \geq 1$
The domain is $[1, \infty)$
(b)
$x = \frac{t}{t-1}$
$(t-1)x = t$
$tx - x = t$
$x = tx - t$
$x = t(x-1)$
$t = \frac{x}{x-1}$
$y = \frac{t-2}{t+1}$
$(t+1)y = t - 2$
$ty + y = t - 2$
$y + 2 = t - ty$
$y + 2 = t(1-y)$
$t = \frac{y+2}{1-y}$
$\frac{x}{x-1} = \frac{y+2}{1-y}$
$x(1-y) = (x-1)(y+2)$
$x - xy = xy + 2x - y - 2$
$2xy - y = 2 - x$
$y(2x-1) = 2 - x$
$y = \frac{2-x}{2x-1}$
Because $-1 < t < 1 \implies \frac{1}{2} < x < \infty$
The domain is $(\frac{1}{2}, \infty)$