Parametric Equations

Convert the following parametric equations to cartesian form. Sketch and indicate orientation.

1. $x = 1 - t$, $y = \frac{t}{1-t}$
$t = 1 - x$
$y = \frac{1-x}{-x}$

2. $x = 2 - \cos t$, $y = 3\sin t + 1$
$\cos t = 2 - x$
$t = \arcsin(2 - x)$
$y = 3\sin(2 - x) + 1$

3. $x = \sqrt{t}$, $y = 2t + 4$
$t = x^2$
$y = 2x^2 + 4$, $x \geq 0$

4. $x = \arctan t$, $y = 1 + t^2$ or $t^2 - 1$
$t = \tan x$
$y = 1 + \tan^2 x \Rightarrow y = \sec^2$, $\frac{-\pi}{2} \leq y \leq \frac{\pi}{2}$

5. $x = 2 - \frac{1}{t}$, $y = 2t + \frac{1}{t}$
$\frac{1}{t} = 2 - x \Rightarrow t = \frac{1}{2-x}$
$y = \frac{2}{2-x} + 2 - x$

6. $x = 1 + \frac{1}{t}$, $y = t - 1$
$\frac{1}{t} = x - 1 \Rightarrow t = \frac{1}{x-1}$
$y = \frac{1}{x-1} - 1$
$y = \frac{1}{x-1} - \frac{x-1}{x-1}$
$y = \frac{2-x}{x-1}$

7. $x = \cos 2\theta$, $y = \sin\theta$