

## Exercise 1

For the following exercises, sketch the curves below by eliminating the parameter  $t$ . Give the orientation of the curve.

$$x = t^2 + 2t, \quad y = t + 1$$

### Solution

Since the second equation is simpler, solve it for  $t$

$$t = y - 1$$

and plug it into the first equation.

$$\begin{aligned} x &= (y - 1)^2 + 2(y - 1) \\ &= (y^2 - 2y + 1) + (2y - 2) \\ &= y^2 - 1 \end{aligned}$$

The graph is of a parabola that opens to the right side. Plugging in  $t = 0$  gives  $x = 0$  and  $y = 1$ , and plugging in  $t = 1$  gives  $x = 3$  and  $y = 2$ . The orientation therefore goes from the bottom to the top.

