1 Review

During our discussion, we talked about how to find integral curves to a vector field that is translationally invariant, that solving an ODE is equivalent to finding some integral curve and how to do so for autonomous ODEs.

2 Suggested Exercises

I) For each of the following, draw the associated vector field in the (t, x) plane (use python). Find the integral curves passing through $(0, x_0)$ parametrized as $\gamma(u) = (t(u), u)$. Then find another parametrization of the save curve as $\gamma'(u) = (u, x(u))$

i) $\dot{x} = x$

ii) $\dot{x} = kx^2$

iii) $\dot{x} = 1 + x^2$

iv) $\dot{x} = \frac{1}{sin(x)}$

v) $\dot{x} = \frac{1}{sin(x)+2}$

vi) $x\dot{x} = 1$

vii) Is there anything different about the last equation compared to the other ones?