Fisher’s Equation

In class we examined the traveling-wave solutions of *Fisher’s equation*:

\[
\frac{\partial N}{\partial t} = N(1 - N) + \frac{\partial^2 N}{\partial x^2}
\]

by letting \(N(x, t) = u(x - ct)\).

Here is the phase plane for \(c = 1\). Note that in this diagram, negative \(x\) corresponds to negative \(u\), and hence disallowed solutions.

Phase plane for \(c = 1\).
We also graph the traveling-wave solution corresponding to $c = 1$; note the negative values.

![Traveling-wave solution for $c = 1$.](image)

Here is the phase plane for $c = 3$. Note that in this diagram, the traveling-wave solution doesn’t cross the $y$-axis. (Negative values of $y$ are acceptable, since they correspond to negative $u'$, which we know must occur.)

![Phase plane for $c = 3$.](image)
We also graph the traveling-wave solution corresponding to $c = 3$. 

Traveling-wave solution for $c = 3$. 