Some plots I made to fix/answer some of the problems in my draft

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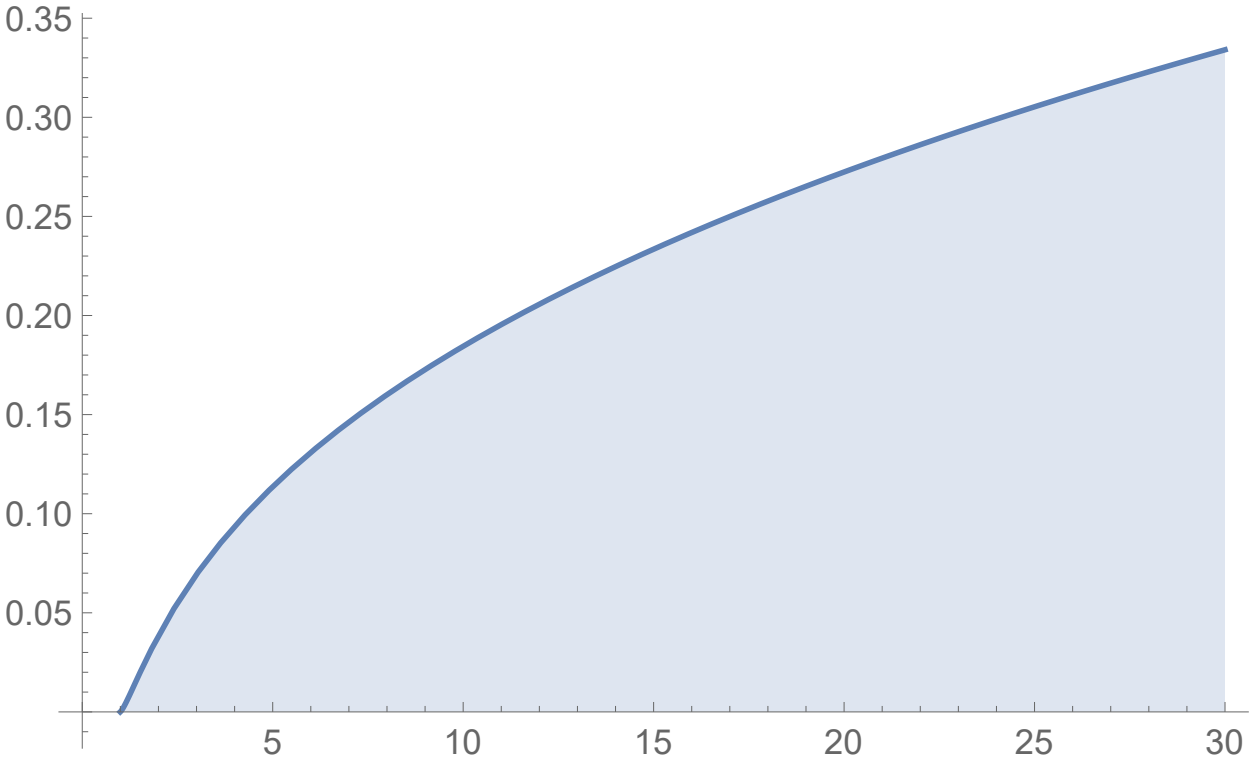
1 Dependence of discriminant on proportion of intentional infection (p) and basic reproduction number ($\mathcal{R}_0$)

The following plot is hopefully more informative than the previous ones.

Figure 1: Dependence of discriminant on p and $\mathcal{R}_0$

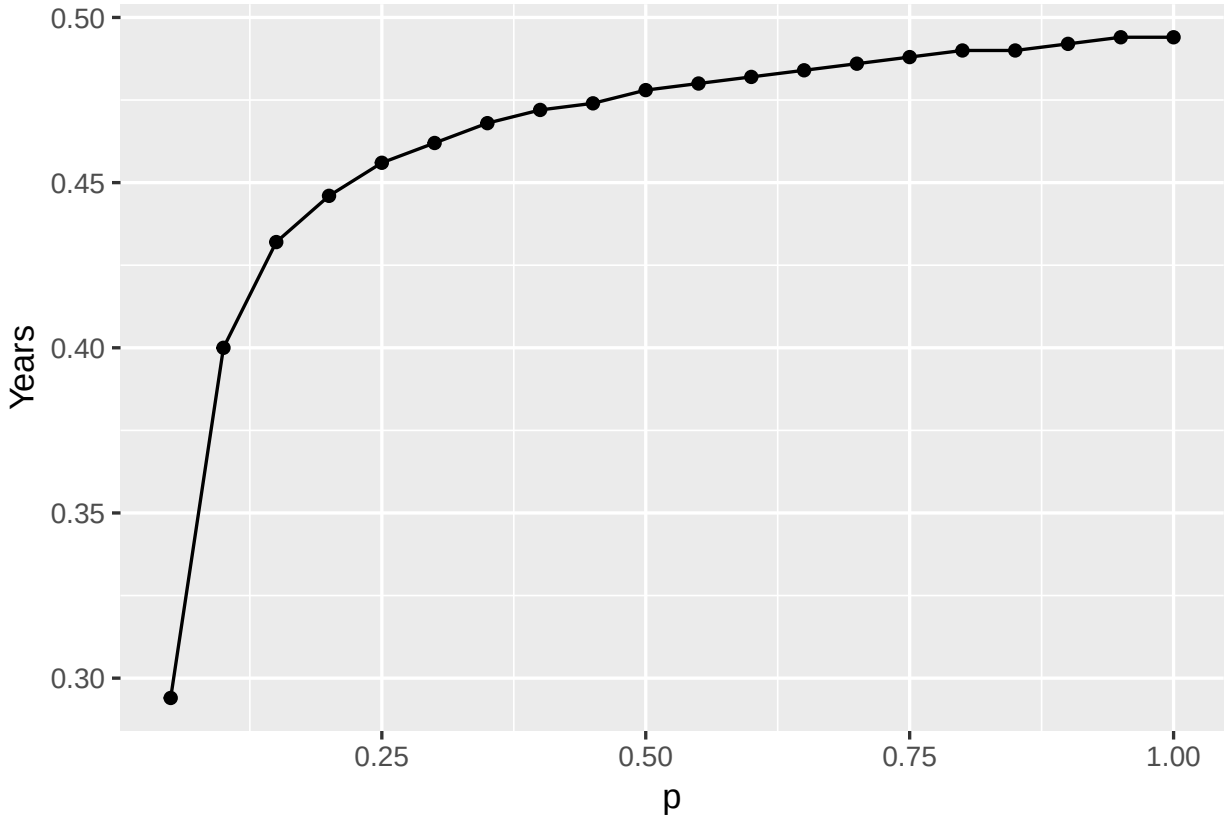


In Figure 1, the shaded area represent the conditions for the system to have damped oscillation.

2 Time for intentional infection to gain advantage over non-intentional infection

My old "Time to advantage" plot is the following.

Figure 2: Time for intentional infection to gain advantage over non-intentional infection



Here it shows, with a lower proportion of intentional infection, we gain advantage relatively faster. This conclusion is misleading, because it is suggesting that, with a minimal proportion of intentional infection, we can minimize the time it takes to gain advantage.

We agreed that, if p is small, though it gains advantage faster, it actually stays very close to non-intentional infection. In another word, the advantage is very insignificant.

Therefore, you suggested that, we can define "Have advantage" to be: mortality by intentional infection is at least 10% lower than mortality with no intentional infection.

Figure 3: Time for mortality of intentional infection is at least 10% lower than non-intentional infection

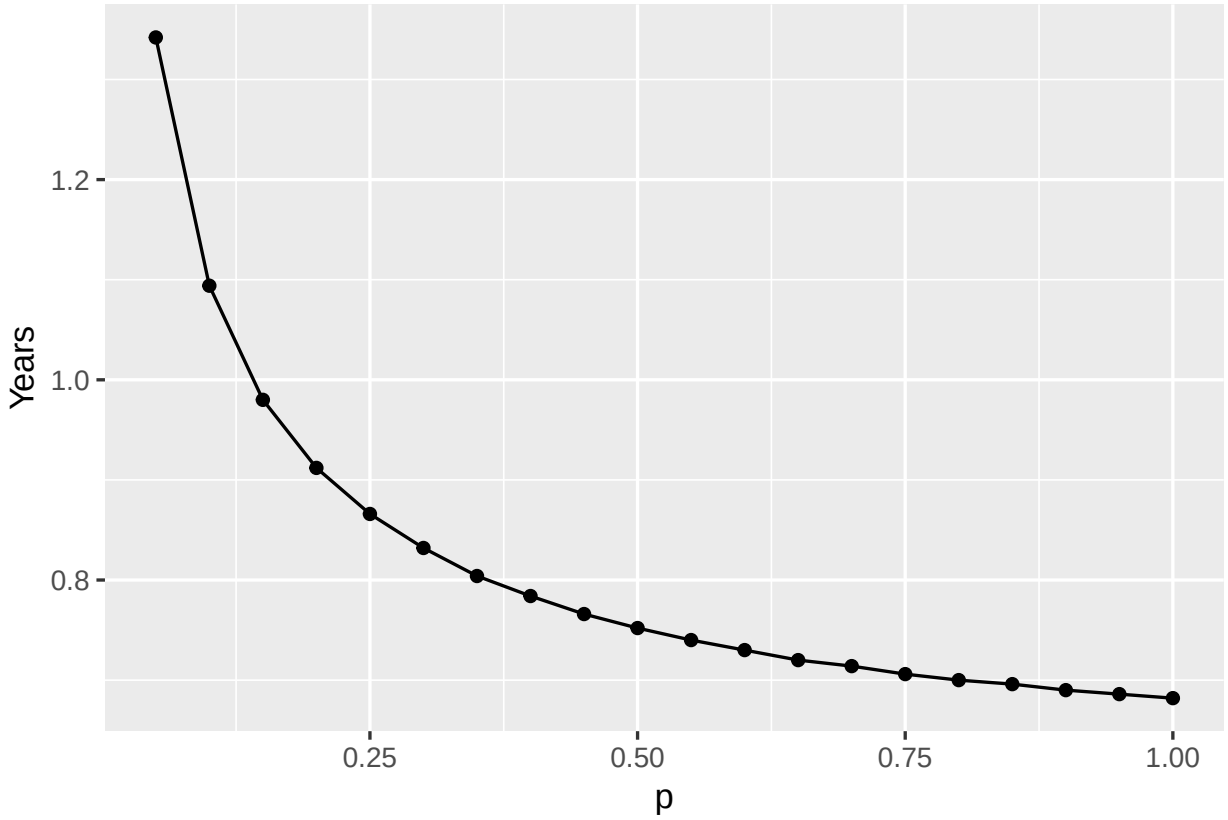


Figure 2 suggests, under our new definition of "Have advantage", a larger proportion p is better.