MATH 315: Fall 2024

Assignment 16

Due: Friday, November 8

Reading: ¨Read Parts F, G, H and I of Section II in Chapter 14 of Olinick

Exercises on SIR Model

Part I: Exercises 17, 19 and 21 of Chapter 14

Part II:

A) We have derived expressions for S as a function of R and for I as a function of S.

(i) Write R as a function of S. [Hint: Solve Equation (27) for R]

(ii) Show that I can be written as $I = N - S_0\, e^{\left(-\frac{\beta}{r}\right)R} - R,$ a function of R.

(iii) Can you write S as a function of I? R as a function of I?

B) A survey of first year students at a residential campus found that 91.1 percent were susceptible to influenza at the start of the year and 51.4% were susceptible at the end of the year. Estimate the basic reproductive number $\frac{\beta}{r}$, the maximum number of students suffering from influenza at any time, and the what fraction of the students would have had to be vaccinated to prevent an epidemic.