

# MATH435 Latex Exercise

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This is the SEIR model:

$$\frac{dS}{dt} = -\beta SI, \tag{1}$$

$$\frac{dE}{dt} = \beta SI - \eta E, \tag{2}$$

$$\frac{dI}{dt} = \eta E - \gamma I, \tag{3}$$

$$\frac{dR}{dt} = \gamma I \tag{4}$$

with initial conditions

$$S(0) = S_0, E(0) = E_0, I(0) = I_0, R(0) = R_0.$$

Note that (2) is not in the usual SIR model .

We can prove that

1. The total population  $N = S + E + I + R$  is constant.
2.  $\lim_{t \rightarrow \infty} S(t) = S_\infty > 0$ , that is, not everybody gets the disease.