1. (a) Looking at the differential equation dI/dt, we find that $I(t)$ will be increasing when $aSI > rI$ and decreasing when $rI > aSI$. From dI/dt, we can conclude the spread of the disease depends on the interactions between the susceptible and the infected with some transmission rate a. By this model, since the number of infected goes up with the interactions between S and I, quarantining would reduce the amount of interactions, thus, reducing the rate at which I grows.

   (b)

$$\frac{dS}{dt} = -aSI, \quad \frac{dI}{dt} = aSI - rI$$

$$\frac{dIdt}{dtdS} = \frac{aSI - rI}{-aSI}$$

$$\frac{aSI}{-aSI} + \frac{rI}{aSI}$$

$$-1 + \frac{rI}{aSI}$$

$$-1 + \frac{r}{aS}$$

$$-1 + \frac{1}{R_0 S}$$