Bees and Flowers

Often scientists use rate of change equations in their study of population growth for one or more species. In this problem we study systems of rate of change equations designed to inform us about the future populations for two species that are either competitive (that is, both species are *harmed by* interaction) or cooperative (that is, both species *benefit from* interaction).

1. Which system of rate of change equations below describes a situation where the two species compete and which system describes cooperative species? Explain your reasoning.

(i) $$\begin{aligned} \frac{dx}{dt} &= -5x + 2xy \\ \frac{dy}{dt} &= -4y + 3xy \end{aligned}$$

(ii) $$\begin{aligned} \frac{dx}{dt} &= 4x - 2xy \\ \frac{dy}{dt} &= 2y - xy \end{aligned}$$