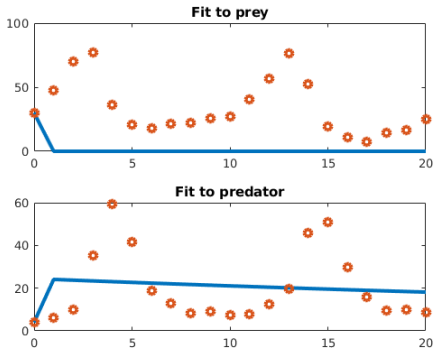
**Solution of ODE2 Problem 12**

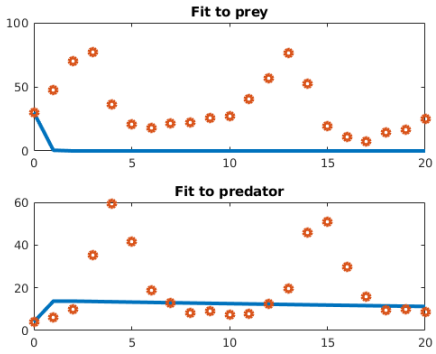
(a)




parameters = 1.5000 1.3563 0.8330 0.0149  error = 3.7867e+04

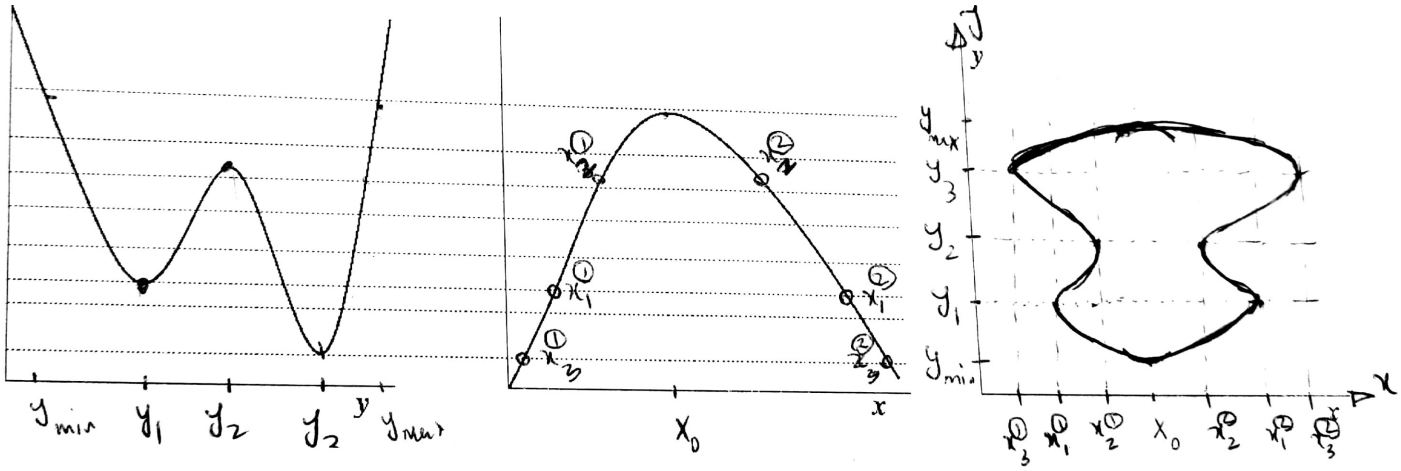
(b) Plot looks almost identical, parameters are 0.5293 0.0269 0.0273 0.8698.

(c) 0.4859 0.4282 0.1226 0.0111




The fit was slightly better in the sum of squares case. A possible explanation is that squaring the large numbers at the begining results in comparatively huge numbers in the error function, forcing the plot to try to match these better,

**Solution of ODE2 Problem 13**



**Solution of ODE7 Problem 1**

(a)

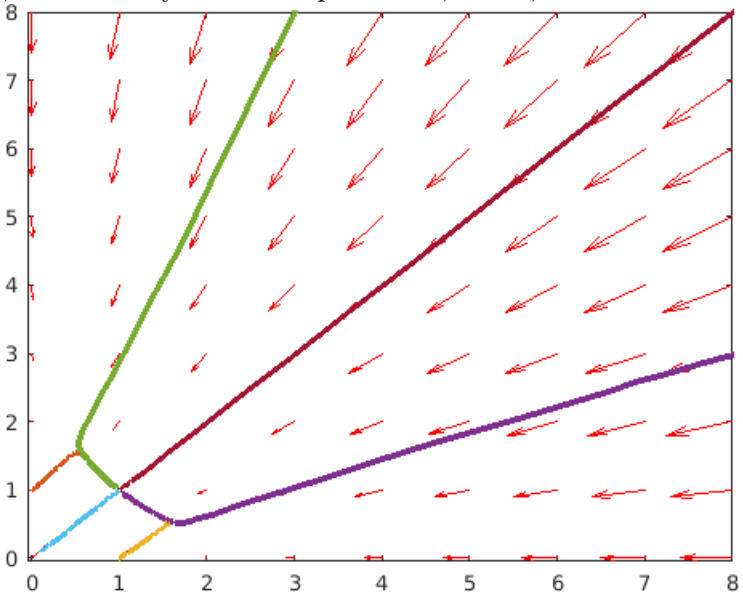
Blue and yellow trajectory converge to a state in which u is high and v is low

Green and red converge to a state in which u is low and v is high

Brown and light blue trajectory converge to a saddle point.

(b)

With $\alpha_1 = \alpha_2 = 1$, there is only one real equilibrium, $u = 1, v = 1$.




All trajectories plotted converge to $(1, 1)$

(c)

We need higher protein expression, given the same amount of repressor. We could make translation more efficient by changing the ribosome binding site strength, for example.

(No points taken off for no or wrong answer for part (c).)