

Answers for First Problem Set

First Problem

Recognize simultaneous search with sequential encounter. Given $e_1 = e_2$, λ_1 and h_1 . What h_2 implies same rate of gain for 1-specialist and 1,2-generalist?

$$h_2 = \left(\frac{1}{\lambda_1} \right) + h_1 \quad \text{since } e_1 = e_2.$$

$$h_2 = (1/2.1) + 7.9 = 8.38$$

Second Problem

Which type is more profitable?

$E_1/h_1 = 3/1$. $E_2/h_2 = 4/2$; therefore, type 1 is more profitable.

$$R_1 = \frac{\lambda_1 E_1}{(1 + \lambda_1 h_1)} = \frac{1(3)}{(1 + 1 [1])} = 1.5$$

$R_1 < E_2/h_2$; generalization favored.

Third Problem

Rare A invades pure B; pure B repels rare A. $p_A = 1$ is not an ESS, and $p_A = 0$ is an ESS.

Fourth Problem

Note 2 pure solutions; each is an ESS.

Last Problem

$$y = 12x - 3x^2$$

$$\frac{dy}{dx} = 12 - 6x; \quad \frac{dy}{dx} = 0 \Rightarrow 12 = 6x$$

$$x^* = 2$$

$$\frac{d^2 y}{dx^2} = -6 < 0 \Rightarrow x^* = 2 \text{ maximizes } y.$$