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Answer to Exercise 5.11

- a. Think in terms of the corresponding Edgeworth box. The Pareto-efficient allocations are the ones in the box where the agents' indifference curves are tangent. These are the allocations $((x_1^1, x_2^1), (x_1^2, x_2^2))$ satisfying:

$$\begin{aligned} \text{(feasibility)} \quad x_1^1 + x_1^2 &= 21 \\ x_2^1 + x_2^2 &= 10 \end{aligned}$$

$$\text{(tangency)} \quad \frac{x_2^1}{x_1^1} = \frac{x_2^2}{2x_1^2}.$$

- b. Core allocations satisfy the conditions, above, and in addition must be “individually rational” for each agent. Thus, in addition to the conditions above, the core allocations must satisfy

$$\begin{aligned} x_1^1 x_2^1 &\geq 72 \\ \ln(x_1^2) + 2 \ln(x_2^2) &\geq \ln(108). \end{aligned}$$

- c. Relative prices $p_1^*/p_2^* = 4/11$ are market-clearing in this economy. At these prices, the WEA will be $((58/4, 58/11), (26/4, 52/11))$.
- d. It is easy to verify that these are satisfy all the conditions on core allocations given above.