Workbook problems

6.1-6.5, 8.1-8.2, 8.4-8.5, 15.0

Supplemental problems

1. As children, Ariel and Bartholomew spend all of their money on silly putty ('good 1') and candy cigarettes ('good 2'). Ariel's utility function is given by $U_A = \ln x_{1A} + \ln x_{2A}$, where x_{1A} and x_{2A} are the quantities of silly putty and candy cigarettes that she consumes, respectively. Likewise, Bartholomew's utility function is given by $U_B = \ln x_{1B} + 2 \ln x_{2B}$, where x_{1B} and x_{2B} are defined analogously.

a) Find Ariel's demand function for silly putty, $x_{1A}(p_1, p_2, m_A)$, and Bartholomew's demand function for silly putty, $x_{1B}(p_1, p_2, m_B)$, given that m_A and m_B are Ariel and Bartholomew's incomes, respectively.

b) If Ariel and Bartholomew are the only buyers of silly putty, find the market demand for silly putty, $X_1(p_1, p_2, m_A, m_B)$.

c) What is the price elasticity of this market demand?

2. When they grow up, Ariel and Bartholomew's preferences change, and now they spend all of their money on vodka cranberry cocktails, which they always make by mixing four parts cranberry juice ('good 1') with one part vodka ('good 2'). Therefore, Ariel's new utility function is $U_A = \min\left\{\frac{1}{4}x_{1A}, x_{2A}\right\}$, and Bartholomew's new utility function is $U_B = \min\left\{\frac{1}{4}x_{1B}, x_{2B}\right\}$.

a) Find Ariel's demand function for cranberry juice $x_{1A}(p_1, p_2, m_A)$, and Bartholomew's demand function for cranberry juice $x_{1B}(p_1, p_2, m_B)$.

b) Find the market demand for cranberry juice $X_1(p_1, p_2, m_A, m_B)$, assuming that Ariel and Bartholomew are the only consumers.

c) Given that the price of vodka is $p_2 = 8$, find the price elasticity of this market demand in terms of p_1.

3. Substitution effects and income effects. Suppose that there is a guy named Hampton who likes Hawaiian Punch. Given that x_1 is the quantity of Hawaiian Punch he consumes per day (in liters), and x_2 is the amount of money he has left to spend on other goods, his preferences can be represented by the utility function $U = 8\sqrt{x_1} + x_2$.

a) Initially, Hampton faces prices $p_1 = 2$ and $p_2 = 1$, and has weekly income $m = 32$. Find x_1 and x_2 (his demand for goods 1 and 2) given these prices and income.

b) Suppose that the price of good 1 changes to $p_1' = 1$. In order to make Hampton's original bundle (from part a) just barely affordable given this price change, you must also change his income to m'. What is m'?

c) If the price of good 1 is $p_1' = 1$, and Hampton's income is m' (from part b), find x_1 and x_2.

d) Now, suppose that the price of good 1 changes to $p_1' = 1$, but Hampton's income remains at its initial value of $m = 32$. Find x_1 and x_2 in this case.

e) We have analyzed Hampton's response to a decrease in the price of Hawaiian Punch from $p_1 = 2$ to $p_1' = 1$. In the table below, indicate the substitution effect, the income effect, and the total effect of this price change on his demand for both goods. Use + and − signs to indicate whether the effect is positive or negative.

	good 1	good 2
substitution effect		
income effect		
total effect		