1. Consider a family that lives in Southern California, and has an income of $4,000 per month, which it spends on electricity and other goods. Suppose that in 1999, the price of electricity was $40 per megawatt hour.

(a) Draw this family’s 1999 budget constraint, depicting their monthly consumption of electricity \((x_1)\) and other goods \((x_2)\). Label the axes, the intercepts and the slope of the budget line.

(b) Suppose that the price of electricity rose to $100 per megawatt hour in the year 2000. Show the effect of this price increase on the family’s budget. Clearly label the budget lines before and after the price change. Indicate the slope.

(c) After the price increase, the local electric company decides to offer a new option: for a flat fee of $400 per month, customers can purchase electricity for just $60 per megawatt hour. That is, if they pay $400, they can buy electricity at a price of $60. Sketch the family’s budget constraint, assuming they choose to accept this new plan. Where does it intersect the line you drew for the previous question (part b)? (Find the coordinates of that point).

2. Ralph consumes only soap and tuna fish. Let \(m\) denote his income, \(P_S\) the price of soap, and \(P_T\) the price of tuna.

(a) Draw his budget constraint. (Put tuna on the horizontal axis, and soap on the vertical axis.)

(b) On the same graph, draw his budget constraint if Ralph is given $10 in cash.

(c) On another graph, draw his budget constraint if Ralph is given $10 worth of tuna fish.

3. Gloria has a passion for flowers and gardening, and she is planning to renovate and expand her plant room. She has $1000 to spend on orchids and insulation.

(a) Orchids cost $5 each, insulation costs $10 per cubic foot. Sketch Gloria’s budget set for orchids and insulation.

(b) Good news: Gloria’s friend Rose, who shares the same hobby, tells her about a discount house that sells orchids for $4. However, they have only 100 orchids to sell. On the same diagram, show Gloria’s new budget set.

4. John is a consumer that consumes only 3 goods, Scotch whiskey \((W)\), designer jeans \((J)\) and meals in French restaurants \((F)\): The price of John’s brand of whiskey is 20 per bottle \((p_W = 20)\), the price of designer jeans is 80 per pair \((p_J = 80)\), and the price of French restaurant meals is 50 per meal \((p_F = 50)\). John has 400 to spend \((I = 400)\)
a) Write down the budget equation for John.

b) Is the consumption bundle (2,3,3) affordable? Is it on the budget line?

c) Is the consumption bundle (2,1,1) affordable? Is it on the budget line?

5. You only consume the composite good Y and marigold seeds. Y sells for $1 per unit. The Acme Seed Company charges $2/lb for the first 10 lb. you buy of marigold seeds and $1/lb for every pound you buy thereafter. If your income is $100, draw your budget constraint for good Y and marigold seeds. Label the slopes of the budget lines.