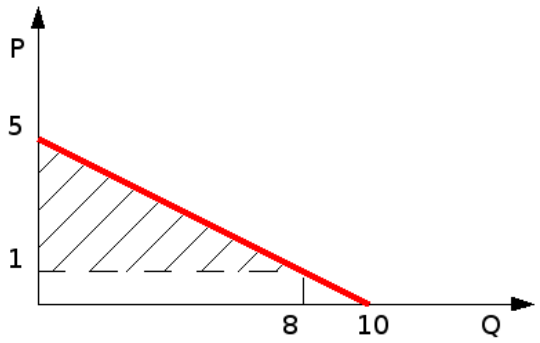
Econ306 – Intermediate Microeconomics
Solutions to Problem Set 3

Question 1 (*2 points*)

When the price is \$1 per pound, the quantity demanded is $Q = 10 - 2 \cdot 1 = 8$ pounds. The intercept of the demand curve with the horizontal axis corresponds to a price of \$0: $Q = 10$; the intercept with the vertical axis corresponds to zero demand: $0 = 10 - 2p \Rightarrow p = \frac{10}{2} = 5$.



The consumer surplus is the shaded area in the graph below, and it is equal to $\frac{1}{2} \cdot (5-1) \cdot 8 = \$16$.

After the price increase, the quantity demanded falls to $Q = 10 - 2 \cdot 2 = 6$ pounds and consumer surplus falls to $\frac{1}{2} \cdot (5-2) \cdot 6 = \$9$. Hence, consumers experience a loss of $16 - 9 = \$7$, meaning that they would be willing to pay up to \$7 to bribe legislators in order to avoid the quantity restrictions imposed.

Question 2 (*2 points*)

(i) (*1 point*) The present value of the five-installment plan is

$$PV = 1 + \frac{1}{1+0.05} + \frac{1}{(1+0.05)^2} + \frac{1}{(1+0.05)^3} + \frac{1}{(1+0.05)^4} = \$4.55 \text{ million.}$$

Since the present value of the annual payments is higher than the one-time payment, Brian should take the first option.

(ii) (*1 point*) The present value of the five-installment plan is now

$$PV = 1 + \frac{1}{1+0.1} + \frac{1}{(1+0.1)^2} + \frac{1}{(1+0.1)^3} + \frac{1}{(1+0.1)^4} = \$4.17 \text{ million.}$$

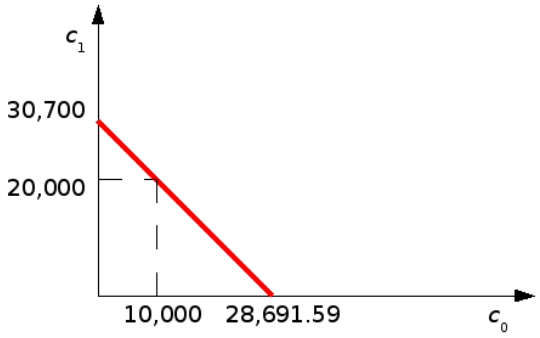
In this case, the one-time payment has a higher value and Brian should choose this option.

Question 3 (*2 + extra 2 points*)

(i) (*1 point*) Jennifer's intertemporal budget constraint is

$$c_0 + \frac{c_1}{1+i} = I_0 + \frac{I_1}{1+i} \quad \Rightarrow \quad c_0 + \frac{c_1}{1.07} = 10,000 + \frac{20,000}{1.07} \quad \Rightarrow \quad c_0 + \frac{c_1}{1.07} = 28,691.59.$$

If Jennifer used all her income on consumption today, then she would be able to consume $c_0 = 28,691.59$; if she used all her income for consumption in the future, she would get $c_1 = 10,000 \cdot 1.07 + 20,000 = 30,700$. Finally, the slope of the budget constraint is $-(1+i) = -1.07$.



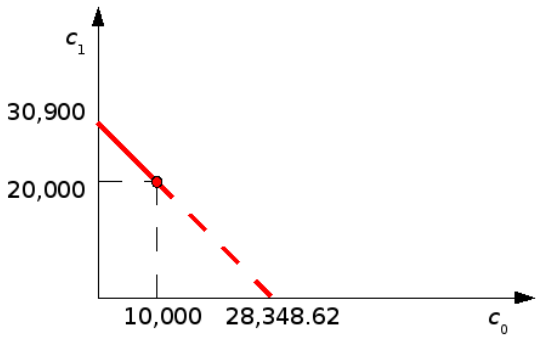
(ii) (*1 point*) Since Jennifer's income is so much higher in the second period, she will most likely borrow some money in the first period to be able to "transfer" some consumption from the future to the present. Being a borrower, she will have to repay more in the future after the interest rate increases. Then, she feels as if she has less money, so the income effect, in this case, would push Jennifer toward consuming less today and thus save more. The interest rate increase is also equivalent to a drop in the price of future consumption. In this case, the substitution effect will push her toward borrowing less (saving more) and hence consuming less today. The final effect is then to increase savings.

(iii) (*extra 2 points*)

When the interest rate is at 9%, the intertemporal budget constraint is

$$c_0 + \frac{c_1}{1.09} = 10,000 + \frac{20,000}{1.09} \quad \Rightarrow \quad c_0 + \frac{c_1}{1.09} = 28348.62.$$

This represents a line with slope equal to -1.09 and intercepts $28,348.62$ with the horizontal axis and $10,000 \cdot 1.09 + 20,000 = 30,900$ with the vertical axis. Since Jennifer is unable to borrow, her consumption in the first period cannot be higher than her income in the first period. Hence, the budget constraint will only include points to the left of her endowment point (the solid line segment in the graph below).



Question 4 (*2 points*)

The expected value of the risky project is

$$E(I) = \$200 \cdot 0.40 + \$150 \cdot 0.60 = \$170.$$

The risk premium, then, is $RP = E(I) - r_f = \$170 - \$160 = \$10$.

Question 5 (*2 points*)

Lynne's endowment point, given by her consumption in both situations (sued/not sued) when she does not buy insurance, is $c_g = \$2,000$ (consumption if not sued) and $c_b = \$2,000 - \$1,000$ (consumption if sued). The insurance company sells her insurance at a premium $r = \$0.30$ per dollar of coverage. An actuarially fair insurance would have a premium equal to the probability of Lynne's being sued, i.e., $\frac{1}{8} = \$0.125$. Therefore, the insurance Lynne buys is not fair and she will not get full insurance.

The slope of the budget line is $\frac{r}{1-r} = \frac{0.3}{0.7} = 0.43$. (Note: If Lynne cannot "sell" insurance, the budget line would consist of only the line segment to the right of the endowment point.) The budget line and the total expenditure on insurance is shown is the graph below.