

Intermediate Microeconomics
Problem Set 2
Due in class Friday October 28

1. Joshua is a student who allocates his income between cigarettes and energy drinks during the week before the exam. The utility function for cigarettes, C , and energy drinks, E , is given by $U(C,E) = CE$. Joshua has \$50 to spend on the two goods, and a pack of cigarettes costs \$2.5 while an energy drink costs \$5.
 - a. Find Joshua's optimal consumption of cigarettes and energy drinks.
 - b. In an effort to reduce smoking, suppose the government decides to impose a tax of \$2.5 per pack of cigarettes that must be paid by the consumer. Show the effect that this tax has on Joshua's budget constraint, and find his new choice of consumption of C and E .
 - c. Find the substitution and income effects of the tax on the number of packs smoked.
 - d. Let's now measure the effect of the tax on Joshua's wellbeing. On separate graphs, show how we find the compensating and equivalent variation of the tax.
 - e. Using your work in part c, what is the compensating variation of the tax?

2. Dave is deciding how much to work in the coming year. He derives utility from consumption, C , but he also really likes taking leisure time L . He must divide his available hours between work and leisure – for every hour of leisure he takes he must work one fewer hours. The function that describes his preferences is given by

$$U(C,L) = \sqrt{CL}.$$

He can earn a wage of w , and suppose the price of consumption is given by $p=1$.

- (a) What is Dave's full income if he can work 2000 hours in a year? What is his measured income? Write down his budget constraint.
- (b) Solve Dave's utility maximization problem and write down his optimal consumption of C and L . What would Dave's choice of leisure and consumption be if $w=20$?
- (c) A payroll tax is proposed that would tax Dave's labor income by 25%. Write Dave's new budget constraint and graph it together with the budget constraint where there is not tax. How much does Dave effectively earn per hour?
- (d) What is Dave's new choice for leisure and consumption?
- (e) Graphically depict the income and substitution effects on leisure hours associated with the tax.
- (f) Will the income and substitution effects have the same sign? What is the intuition for this?