1. John can purchase a house for $100 a square foot and spends the rest of his money on other goods. His annual income is $200,000.
   
a. Draw John’s budget line.

With housing on the X axis, intercept is 2000 square feet. Y axis has consumption on all other goods with y intercept of $200,000.

b. Now suppose that the government taxes housing purchases at $50 a square foot. Suppose that the supply of housing is perfectly elastic, so the full burden of the tax falls on demanders like John. Suppose that with this tax, John chooses to buy a house that is 800 square feet. Indicate this point on your budget constraint.

This means the new x-intercept is 200,000/(150) = 1333 square feet. John chooses 800 square feet, so expenditures on housing are 800*150 = $120,000, leaving him $80,000 of consumption on other goods.

c. Would John prefer the housing tax or would he prefer to be taxed a lump sum of $40,000 or can you say? Justify your answer using a budget constraint/indifference curve diagram.

John is paying the government $50*800 = $40,000 in taxes with the property tax. He can get on a higher indifference curve with the lump sum tax.

2. Suppose the price of apples is $3 per pound and income is $12.
   
a. Given the following indifference curve diagram, construct a demand curve for bananas. (Your demand curve should have 3 points.)
Demand curve has these points: $P=1, Q=7; P=2, Q=5; P=3, Q=3$

b. Compute the **price elasticity** moving from the budget line with an $x$-intercept of 4 to the line with an intercept of 6. (We didn’t put this formula up on the board, but the price elasticity is $\%$ change in quantity demanded/$\%$ change in price).

c. Then compute the price elasticity moving from the budget line with an intercept of 6 to the line with an intercept of 12. Interpret these elasticities.

\[
\text{Price elasticity} = \frac{\% \text{ change in } Q}{\% \text{ change in } P} = \frac{(3-5)/3}{(3-2)/3} = -2 \text{ elastic}
\]
\[
= \frac{(5-7)/5}{(2-1)/2} = -0.8 \text{ inelastic}
\]

3. You consume only CDs and books. Suppose the price of CDs is $10.

Given the following indifference curve diagram,

![Indifference Curve Diagram](image)

a. Compute the **income elasticity**. Interpret this elasticity.

*Income at first budget line is $100. Income at 2nd budget line is $200.*

\[
\text{Income elasticity} = \frac{\% \text{ change in } Q}{\% \text{ change in Income}} = \frac{(5-15)/5}{(100-200)/100} = 2 \text{ normal}
\]

b. Can you say anything about whether the price elasticity for CDs indicates whether this good is elastic or inelastic?

*No—can only say if is normal or inferior. Need to know how responds to price changes to talk about elastic/inelastic.*
4. Sam’s income demand elasticity of ham is 1.4 and his income elasticity of demand
for green eggs is -0.05. Which good is normal and which is inferior?

*Ham is normal, green eggs is inferior*

5. Sharon can work up to 24 hours a day. Her wage is $10 an hour.

a. Draw her budget constraint. Be sure to label all intercepts.

*The blue line represents the original budget constraint.*

b. What is the slope of the budget constraint? Explain how the slope relates to an
opportunity cost.

*Its slope is -10—the wage. The wage is the opportunity cost of leisure—the price
of leisure in terms of dollars foregone that could have been spent on other stuff.*

c. Suppose that Sharon is subject to a 50% tax on all income over $50 a day. Draw the new
budget constraint, clearly labeling the intercepts.
The new budget constraint has two parts. Income below $50 is untaxed, so the BC is the same blue line between 24 hours of leisure and 19 hours as leisure. With less leisure (and more work) than that, the new BC pivots down to the black line—the slope now is \(-5\) instead of \(-10\) since an hour of leisure means forgoing $5 in (after tax) consumption.

d Suppose that instead of a tax, the government gives Sharon $10 in welfare payments if her income is less than $50. Draw the new budget constraint. Can you say how this plan might affect Sharon’s incentives to work?

The new budget constraint has a parallel shift out of $10 for all income < $50—so the red budget line. After 19 hours of leisure and $50 of income, the budget constraint follows the original blue line, so the budget constraint has a deep notch in it. As a result, if leisure is a normal good, individuals will consume more leisure with the welfare plan, Many people will be on their highest IC at the notch point.