1. (5) Suppose a firm producing Pittsburgh Steeler Coffee Mugs pollutes a river when producing the product. List and explain the basic idea (out of the nine that we covered) that this example addresses. Why does the market system fail to account for the pollution in this example? The basic idea is an externality. The pollution introduces a cost to a third party (not a cost to producers/consumers of the good). A market system operates by adhering to the goals of the producers (profit max) and the consumers (utility max). The market system does not incorporate additional costs/benefits to a third party.

2. (5) Suppose you have already arranged to make a road trip to Las Vegas. An acquaintance asks if you are willing to allow him/her to ride with you. Using the marginal principle, examine whether you should allow this person to ride with you, assuming the person is willing to pay half of the gas money (but does not offer to pay half of the wear and tear of the car). What is the lowest amount of compensation you would need (using the marginal principle) to allow the person a ride? Marginal principle: give the person a ride if the $MB \geq MC$. The $MB$ is any money the individual pays you (could also include the company or joy of having another person). The $MC$ is any additional gas or wear and tear you will experience with additional weight (could also include costs of annoying person). Lowest compensation is such that $MB \geq MC$ or $\text{compensation} \Rightarrow MB = MC$. 
3. (13) Consider the perfectly competitive market for gasoline.

\[ P \quad S_1, \quad S_0, \quad D_1, \quad D_0, \quad Q_1, \quad Q_0, \quad Q \]

a. (2) Draw typical supply and demand curves. Label the equilibrium price and quantity.

b. (2) The national average price of gasoline has risen by approximately 12 cents in the past two weeks. The news reported that a reason for this was the high demand (thus higher price) for heating oil because of the cold winter temperatures in the Northeast. Using your knowledge of supply and demand, illustrate this reason in your graph (assuming this is the only reason).

\( \downarrow S \quad (S_0 \rightarrow S_1) \)

c. (5) Explain why the market changes (if you have shifted a curve, explain your shift) and explain the transition to the new equilibrium.

\( \downarrow S \) The price of a related good is production increased. Thus firms shift some of their production of gas to heating oil. This \( \downarrow Q_s \) at every price.

Transition: After the \( \downarrow S \), at \( P_0 \) \( Q_D > Q_s \) \((Q_0 > Q_E)\) or there is a shortage. This puts upward pressure on price until \( Q_D = Q_s \) at \( P_1, Q_1 \).

d. (4) Suppose actual data suggest that the quantity purchased during the past two weeks increased. Would the explanation in part b make sense? Explain. Provide an explanation for one possible reason that would be consistent with the data observed.

No because with an increase in supply, \( T_P, UQ \). Any reasonable explanation for why \( T_D \) will suffice. Need an \( T_D \) for market \( P^1, Q^1 \).
4. (4) Oregon is currently facing a budget shortfall and is required by law to balance the budget. Some people have proposed implementing sales taxes on certain goods. If the objective of the government is to raise revenues, what type of good should the state tax? Make sure to explain why it makes sense to tax this type of good to raise significant revenue.

    Should tax an inelastic good. If a good is inelastic, then the \( \frac{\text{\% change in } Q_D}{\text{\% change in } P} \) \( < 1 \). A tax will move the market \( P \) to \( Q_D \). If you want to raise significant revenue, you would like the \( \frac{\text{\% change in } Q_D}{\text{\% change in } P} \) to be relatively small.

\[
\frac{\text{\% change in } Q_D}{\text{\% change in } P} < 1
\]

5. (5) Given the national price elasticity of demand for gasoline is 0.2, should the City of Eugene implement a gas tax in order to pay for road maintenance? Make sure to discuss some of the factors of price elasticity in your answer.

The city of Eugene should base its decision on a local \( E_d \) not a national one. Given Eugene's close proximity to Springfield, there might be more available substitutes than nationally (making gas more elastic). Also, the city could have a relatively good mass transit system, so gas might be more of a luxury than nationally (more elastic). To address local revenues, you need a local measure of elasticity of demand.
6. (8) Suppose you only purchased pizza and you decided to purchase 5 slices of pizza at $2.00 per slice to maximize your utility. What can you say about your change in total utility from consuming the fourth slice (going from the fourth to the fifth slice)? What do you know about the change in total utility if you were to consume a sixth slice (going from the fifth to the sixth slice, assuming your utility maximizing decision lead you to only purchase 5)? Explain how the marginal principle leads consumers to the optimal purchasing rule if there is only one good. Explain how this rule changes when you consume more than one good.

\[ MU_{4-5} \geq 2.00 \] principle says to activity if \( MB \geq MC \), thus \( MU \geq Price \). Consuming the sixth slice must be \( MU_{5-6} < 2.00 \) because you chose not to do it. If only one good consume as long as \( MU \geq P \) (or \( MB \geq MC \)). Ideally up to point where \( MU = P \).

This changes will more than one good because we factor in the opportunity cost of other goods. This we consider the ratio of \( MU \) per price of all goods: \( \frac{MU_1}{P_1} = \frac{MU_2}{P_2} = \ldots \).

7. (6) Provide a graph of a typical total physical product of labor curve. Describe what is happening to the change in output given a change in labor in these regions in your graph. Explain how this can happen using a real-world example.

\[ a - Q \text{ is increasing at an increasing rate as you } \uparrow \text{ labor. BK. } \text{Adding workers leads to specialization, less productivity at task. Burger guy, fry guy, soda guy.} \]

\[ b - Q \text{ is increasing at a decreasing rate. BK. } \text{Having 2 fry guys only } \uparrow \text{ output a little (not as much as specialization in fries, burgers, etc). Only so much specialization you can do.} \]

\[ c - Q \text{ is decreasing as } L \uparrow. \text{ BK. Workers begin to run into one another } \rightarrow \text{ Borders (output)} \]
8. (4) Explain the optimal input hiring rule assuming only labor can vary. List the marginal benefit and the marginal cost of labor.

Hire labor as long as \( MB \geq MC \).

The MB of labor is the marginal revenue product. This is the change in Q given a change in labor times the price of the output (\( MP \times P \)).

The marginal cost of labor is the wage.

Extra Credit

1. (3) Explain how the utility maximizing rule changes when there is more than one good. Explain why the rule changes. \( MU \geq P \) when 1 good

As you add more goods, you have to consider the opportunity cost of the money you are spending. This the rule changes to \( \frac{MU_1}{P_1} = \frac{MU_2}{P_2} = \ldots \) for all goods. This gives you the same bang for your buck for all goods \( \Rightarrow \) utility max.

2. (2) Explain why Ted Koppel was wrong in the example that we covered in class.

He claimed that cocaine prices \( \uparrow \) due to an \( \uparrow \) supply. Data suggest that prices \( \uparrow \) due to a \( \downarrow \) demand. Thus his assertion that the war on drugs had failed (\( \uparrow \) price) was not so obvious. The \( \downarrow \) in demand could have happened because of \( \uparrow \) education about the harmful effects of drugs.

Please list a secret code so that you can identify your scores if they are posted on-line.
This code should be 4-8 characters (can include numbers) long.