1. a. Please define the term public good. If you cite characteristics that make a good a public good, please define these as well.

   A good that is both non-rival and non-excludable. My use of the good does not affect your use of the good.

   Non-excludable. It is not possible (or worth) excluding the non-payer.

b. Give an example of an actual public good besides defense.

   Dam. Improved air quality

c. Let us suppose that tchatchkes are NOT a public good. There are two people in a society, Robinson and Crusoe, and their demand for tchatchkes is given below.

   Robinson: \( Q = 40 - 2P \)

   Crusoe: \( Q = 20 - P \)

   If the price was \( P = 16 \), please calculate how many tchatchkes would be purchased.

   \[
   \begin{align*}
   \text{Robinson:} & \quad Q = 40 - 2P \\
   & \quad = 40 - 32 = 8
   \\
   \text{Crusoe:} & \quad Q = 20 - P \\
   & \quad = 20 - 16 = 4
   \\
   & \quad 8 + 4 = 12 \text{ tchatchkes}
   \end{align*}
   \]

d. If tchatchkes WERE a public good, please calculate how many would be purchased.

   \[
   \begin{align*}
   \text{Need to add quantities at each price} & \\
   \text{Robinson:} & \quad Q = 40 - 2P \\
   & \quad Q - 40 = -2P \\
   & \quad 20 - 5P = P \\
   \text{Crusoe:} & \quad Q = 20 - P \\
   & \quad Q - 20 = -P \\
   & \quad 20 - 4 = P \\
   & \quad 40 - 1.5P = 0
   \end{align*}
   \]

   People will under consume a public good they need to buy.

   \[
   \begin{align*}
   40 - 1.5(16) & = 40 - 24 = 16 \text{ tchatchkes}
   \end{align*}
   \]
2. The private marginal benefit associated with a product’s consumption is $PMB = 360 - 4Q$ and the private marginal cost associated with its production is $PMC = 60$. Furthermore, the marginal external damage associated with this good’s production is $MD = 20$.

a. If the consumer ignored the external damage, how much of the product would they consume?

$$PMB = 360 - 4Q = 60 = MC$$
$$360 - 4Q = 60$$
$$300 = 4Q$$
$$75 = Q$$

b. What is the socially optimal quantity that should be consumed?

$$SocMB = PMB - MD = 360 - 4Q - 20$$
$$= 340 - 4Q$$

$$SocMB = 340 - 4Q = 60 = PMC$$
$$340 - 4Q = 60$$
$$280 = 4Q$$
$$70 = Q$$

C. What is meant by the term Pigouvian Tax?

A tax equal to the negative externality (Marginal Damage) caused by a product.

d. How much should the Pigouvian Tax be?

$10 = MD$
Suppose that there are two members in a society, Magglio and Katy. The only good they consume is fish (F). Their Utility Functions are:

Magglio: Utility = $U_M = 10F$
Katy: Utility = $U_K = 60 - \frac{50}{F}$ for $F > 0$; else 0

If there are five fish to be divided between the two, calculate the utility for each:

<table>
<thead>
<tr>
<th>Fish for Magglio</th>
<th>Fish for Katy</th>
<th>Magglio’s Utility</th>
<th>Katy’s Utility</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>5</td>
<td>0</td>
<td>50</td>
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<tr>
<td>1</td>
<td>4</td>
<td>10</td>
<td>47.5</td>
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<td>5</td>
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</tbody>
</table>

a. Calculate the utility for Magglio and Katy for each division of the fish between the two.

b. How would a Utilitarian advocate the fish be divided? Explain why they would advocate that division of fish.

    3 to Magglio
    2 to Katy

c. How would a Rawlsion advocate the fish be divided? Explain why they would advocate that division of fish.

    3 to Magglio
    2 to Katy

d. Please recalculate the table if their utility functions were:

Magglio: $U_M = 10F_M + F_K$
Katy: $U_K = 60 - \frac{50}{F_K} + .1F_M$ (If $F > 0$; else 0)

(F_M is Fish to Magglio and F_K is Fish to Katy)

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</table>
4. The Kyoto Treaty was passed to deal with the problem of global warming.
   i) Did the Treaty use regulation (command and control), price instruments or quantity instruments to reduce global warming?
   ii) Describe how the Treaty works.
   iii) Would you advocate the use of regulation, price instruments or quantity instruments to reduce global warming? Make a case for your choice as being the best method in this case. (Please assume the goal IS to reduce global warming to the optimal level.)
(Numbers 5-7 are worth 8 points each. NO choice. Do them all.)

5. Defense is different from other goods. Aside from the fact it is a public good, in class I presented four such characteristics. Cite two and briefly explain them.

- "Soft" budget constraint. The amount of money depends on how they ask, past success, what it will be used for.
- Need experts to help decide what to do.

- Lack of competition. Frequently only 1 buyer and only 1 seller.
- Many of the goods don't yet exist and must be developed.

6. We discussed six market failures and two other reasons for the government to intervene in a market. Please explain how government involvement in education can be justified on the basis of two of the market failures and one of the other reasons.

- Merit good - we think education is good and we require people to have it
- Inc externality. Education will lead to income so giving people educ will increase future inc
- Eternalities - people will make more money & pay more taxes if have educ.
- Incomplete info. Without govt help people could notburden to go to college.

7. What is meant by the idea of network externalities? Please give an example of one.

Network externalities are when other people using a good affects your utility from using the good. Examples are phones, faxes, Facebook, linkedin.
Numbers 8-18 are multiple choice. Circle the best answer. Two points each.

8. Suppose that the competitive equilibrium does not lead to the efficiency-maximizing outcome. Which of the following statements is true?

a. Government intervention will increase efficiency.
b. Government intervention will reduce efficiency.
c. Government intervention may increase or decrease efficiency.
d. Government intervention will not affect efficiency.

9. Suppose Andrew must decide how to spend $100 on DVDs and video games. The rate at which Andrew is willing to trade DVDs for video games is referred to as the

a. opportunity cost of a DVD.
b. marginal rate of substitution.
c. marginal rate of transformation.
d. budget constraint.
e. none of the above

10. Suppose that the price of pizza increases. The _______ effect means that, holding utility constant, you will consume _______ pizza than you did before.

a. income; less
b. income; more
c. income; the same amount of
d. substitution; more
e. substitution; less

11. Suppose that one study were to estimate the effect of public smoking bans by looking at rates of smoking across states over time when some of those states adopt smoking bans. This study takes which approach?

a. Time series analysis
b. Cross-sectional regression analysis
c. Randomized trial
d. Quasi-experiment
e. None of the above
2. Complete the following sentence: Government existed throughout the 1980s.
   a. surpluses
   b. deficits
   c. balanced budget requirements
   d. both b and c
   e. both a and c

13. The Coase Theorem states that when there are well-defined property rights and costless bargaining, then in a market in which there is an externality which of the following is true?
   a. The socially optimal level of consumption can be achieved through the use of taxes and subsidies by the government.
   b. The socially optimal level of consumption can be achieved through the use of quantity restrictions by the government
   c. The socially optimal level of consumption can be achieved through negotiations between the affected parties
   d. The socially optimal level of consumption cannot be achieved without mediation by the government
   e. Both a and b

14. Taxing the producer of an externality based on the amount of the externality produced is equivalent to which of the following?
   a. Subsidizing the consumer
   b. Subsidizing those outside the market
   c. Increasing the producer's input costs
   d. Increasing the benefits of the consumers in the market
   e. Both c and d

15. Which of the following implies that smoking causes an externality?
   a. Employers adjust individuals' wages according to productivity.
   b. There are no effects of secondhand smoke.
   c. Fires set by smokers raise fire insurance premiums for everyone.
   d. Insurance companies actuarially raise premiums for smokers.
   e. Both a and c

16. The damage one does to oneself through adverse health (or other) behavior is referred to as which of the following?
   a. Actuarial adjustment
   b. Compensating differential
   c. Commitment device
   d. Internality
   e. Self-control problem
17. Cable television is which of the following?

- a. excludable but not rival
- b. rival but not excludable
- c. both rival and excludable
- d. neither rival nor excludable
- e. altruistic

18. Suppose that in response to government giving grants to local medical research projects, you reduce your annual gift. This is an example of which of the following problems with the public provision of a public good?

- a. measuring preferences for the public good
- b. crowding-out of private provision
- c. measuring the costs and benefits of public goods
- d. all of the above
- e. both a and c

19-21 Two points each.

19. Suppose the government wanted to build a dam that would provide recreation opportunities. Describe how they actually determine the Social Marginal Benefit from such recreational activities.

- survey people as to what it is worth to them
- Look at what people pay for convenience

20. Aside from the provision of highways, cite one other area of government intervention that Milton Friedman argued the government should NOT be involved in. (Please base your answer on the reading for class.)

- minimum wages
- agricultural price supports

21. In terms of education, what are vouchers?

- The voucher gives you a coupon which can be used for education at any school, public or private.