Problem 1.

**HHI**: Compute the HHI for the US web search market and the US higher education market. (You can limit yourself to the three largest search engines and the five largest universities.) Do these industries qualify as highly concentrated? What are the limitations of this approach to assessing competition for these two markets?

**Solution.**

1) **HHI for three largest search engines in U.S.**

According to the ComScore values of 2015, the percentages of the market shares of the three largest search engines are as follows:

<table>
<thead>
<tr>
<th>Company</th>
<th>Market share percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Google</td>
<td>63.9%</td>
</tr>
<tr>
<td>Microsoft</td>
<td>20.9%</td>
</tr>
<tr>
<td>Yahoo</td>
<td>12.5%</td>
</tr>
</tbody>
</table>

Since the definition of HHI is sum of squared market shares, we can obtain the HHI for the U.S. web search market:

\[
HHI = (\text{Term 1})^2 + (\text{Term 2})^2 + (\text{Term 3})^2
\]

\[
= (63.9)^2 + (20.9)^2 + (12.5)^2
\]

\[
= 4083.21 + 436.81 + 156.25
\]

\[
= 4676.27
\]

As per the HHI calculation (significantly greater than 2500), it can be said that the web search market has a very high concentration.
2) **HHI for five largest universities in U.S.**

The five largest universities based on enrollment are given in the following table. The market share was computed considering the total undergraduate enrollment in degree-granting postsecondary institutions which was 17.5 million students in fall 2013.

<table>
<thead>
<tr>
<th>University</th>
<th># of Students Enrolled</th>
<th>Market Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arizona State University</td>
<td>60,169</td>
<td>0.3438%</td>
</tr>
<tr>
<td>University of Central Florida</td>
<td>60,048</td>
<td>0.3431%</td>
</tr>
<tr>
<td>Texas A&amp;M University</td>
<td>58,804</td>
<td>0.3360%</td>
</tr>
<tr>
<td>The Ohio State University</td>
<td>57,466</td>
<td>0.3283%</td>
</tr>
<tr>
<td>University of Texas at Austin</td>
<td>52,186</td>
<td>0.2982%</td>
</tr>
</tbody>
</table>

**Sources:**

\[
\text{HHI} = (\text{Term 1})^2 + (\text{Term 2})^2 + (\text{Term 3})^2 + (\text{Term 4})^2 + (\text{Term 5})^2
\]

\[
= (0.3438)^2 + (0.3431)^2 + (0.3360)^2 + (0.3283)^2 + (0.2982)^2
\]

\[
= 0.1182 + 0.1177 + 0.1180 + 0.1077 + 0.0889
\]

\[
= 0.5507
\]

As per the HHI calculation (significantly less than 1500), it can be said that the higher education market has less concentration.

**Limitations of using the HHI in the above examples**

The HHI fails to consider the barriers to entry and firm turnover. For example, in some markets, only a few firms may be currently operating in the market, but the competition nevertheless, may be strong, because firms regularly enter and leave the market. Even potential entry may be enough to maintain competition in the market. Also the HHI is dependent on product class definition, some firms may or may not be considered according to the product class definition which may skew calculation results and make them less accurate. Similarly, it does not include elasticity of demand. Furthermore, concentration measures such as the HHI do not consider foreign production or revenues as it is a national calculation, which may be an integral part of the analysis as it may result in the overestimation of a domestic industry and the underestimation of foreign contribution.

**Source:**
Problem 2
Laws and regulations: In the US, both the Federal law making process and the regulatory process provide for the opportunity for the public and interest organizations to influence the outcome. Briefly compare and contrast the two processes.

Solution

1) Creating a law

Step 1: Congress Proposes a Bill
A member of Congress proposes rules representing the interest of an organization. These rules are then drafted into a bill. A bill is a document that, if approved, will become law.

Step 2: Congress and the President Approve or Veto the Bill
If both houses of Congress approve a bill, it goes to the President who has the option to either approve it or veto it. If approved, the new law is called an act or statute.

Step 3: The Act is Codified in the United States Code and the law is put to work

Once an act is passed, the House of Representatives standardizes the text of the law and publishes it in the United States Code (U.S.C.). The U.S.C. is the codification by subject matter of the general and permanent laws of the United States. Since 1926, the U.S.C. has been published every six years. In between editions, annual cumulative supplements are published in order to present the most current information.

Once a law is official, here's how it is put into practice: Laws often do not include all the details needed to explain how an individual, business, state or local government, or others might follow the law. In order to make the laws work on a day-to-day level, Congress authorizes certain government agencies - including EPA -to propose regulations.

Regulations set specific requirements about what is legal and what isn't. For example, a regulation issued by EPA to implement the Clean Air Act might explain what levels of a pollutant -such as sulfur dioxide -adequately protect human health and the environment. It would tell industries how much sulfur dioxide they can legally emit into the air, and what the penalty will be if they emit too much. Once the regulation is in effect, EPA then works to help Americans comply with the law and to enforce it.
2) Creating a regulation

When developing regulations, the first thing we do is ask if a regulation is needed at all. Every regulation is developed under slightly different circumstances, but following is the general process:

Step 1: EPA Proposes a Regulation
The Agency researches the issues and, if necessary, proposes a regulation, also known as a Notice of Proposed Rulemaking (NPRM). The proposal is listed in the Federal Register (FR) so that members of the public can consider it and send their comments to us. The proposed rule and supporting documents are also filed in EPA’s official docket on Regulations.gov.

Step 2: EPA Considers Your Comments and Issues a Final Rule
Generally, once we consider the comments received when the proposed regulation was issued, we revise the regulation accordingly and issue a final rule. This final rule is also published in the FR and in EPA’s official docket on Regulations.gov.

Step 3: The Regulation is Codified in the Code of Federal Regulations
Once a regulation is completed and has been printed in the FR as a final rule, it is codified when it is added to the Code of Federal Regulations (CFR). The CFR is the official record of all regulations proposed by the federal government. It is divided into 50 volumes, called titles, each of which focuses on a particular area. Almost all environmental regulations appear in Title 40. The CFR is revised yearly, with one fourth of the volumes updated every three months. Title 40 is revised every July 1.

3) Brief compare and contrast of two processes

<table>
<thead>
<tr>
<th>Similarities</th>
<th>Differences</th>
</tr>
</thead>
</table>
| **Step 1**   | *For law, a member of Congress proposes a Bill*  
*For regulatory, an Agency proposes a Bill* |
| **Step 2**   | *For law, need both Congress and the President's decision*  
*For regulatory, need EPA's decision* |
| **Step 3**   | *For law, codified in the United States Code*  
*For regulatory, codified in the Code of Federal Regulations* |

4) **How public influences the processes**

For laws, these include writing or calling the representative or senator, making (large) contributions to his or her re-election campaign fund or contributing or being a member of an advocacy organization that lobbies for or against proposed laws with Congress (typically, through registered lobbyists).

For the regulatory process, the public can contribute formal or brief comments in response to NOIs or NPRMs. Public interest organizations can make their points in meetings with regulatory staff. Scientists and engineers may author studies, briefs or papers that inform the rule-making process.

**Problem 3**

**Internet Essentials**: Comcast and other cable providers offer [Internet Essentials](https://apply.internetessentials.com/), a program for low-cost Internet access for low-income consumers. Analyze the program in the terms of our in-class economic discussion. What are providers doing to limit their potential downside?

**Solution**

The Internet Essentials program for low cost Internet access for low-income consumers began in Fall 2011 and was initially set to a term of 3 years. After a successful launching and incubation period Comcast has decided to extend the program indefinitely. The program itself offers a 5 megabit-per-second downloads for $9.95/month. Usually this service starts with an average cost of $50/month but through understanding the diminished ability of the market to pay this high amount Comcast has implement a systematical take on price discrimination. Additionally, the program offers a basic computer starter package for $150.

Certain distinguishing components are necessary for members to qualify for the program. To qualify a family of four needs an annual income of $43,568 or less.

The program can be considered a form of price discrimination. By restricting access to low-income consumers, the provider can gain customers without having to reduce the price to higher-income consumers. Providers restrict the offer in various ways: For example, it is not possible to re-sell the service (and sharing Wi-Fi is officially prohibited) since it is limited to a particular residential address. Also, the speed of the Internet connection is much slower than that offered to regular customers. Thus, this is similar in some ways to the discounts offered to seniors or families with children for other products.

**Sources:**

- [http://www.oregonlive.com/silicon-forest/index.ssf/2014/03/comcast_will_continue_offering.html](http://www.oregonlive.com/silicon-forest/index.ssf/2014/03/comcast_will_continue_offering.html)
- [https://apply.internetessentials.com/](https://apply.internetessentials.com/)
**Problem 4**

**Asymmetric information:** Describe and briefly compare three ways to combat information asymmetry.

**Solution**

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guarantees and Warranties: they benefit the firm as they attract customers</td>
<td>through assurance of good quality goods and services, especially in case of bad goods or services.</td>
</tr>
<tr>
<td>Consumer Protection Regulation: these laws set a standard of functioning</td>
<td>for all firms.</td>
</tr>
<tr>
<td>External Product Certification: external certifications obtained by firms</td>
<td>to prove expertise to customers on their goods and services.</td>
</tr>
</tbody>
</table>

Problem 5

The outlawing of encryption (or the requirement of depositing a key with a government agency) has both First and Fourth Amendment implications:

**First Amendment:**
The “pro” for allowing encryption based on First Amendment grounds is that the First Amendment is supposed to protect, among other things, the freedom of speech. Encrypted speech is still speech, and in fact actively protects people’s speech that may be critical towards the government. The con of allowing encryption using the First Amendment argument is that with threats like ISIS, encrypted speech may, in the words of Oliver Wendell Holmes, create a “clear and present danger” to the United States that the government has the right to address. Therefore, because of this danger, the United States would not be violating the First Amendment by requiring the deposit of an encryption key.

**Fourth Amendment:**
The Fourth Amendment protects against unreasonable search and seizure without a warrant and probable cause. If the government decrypts and examines all communication, this would be a Fourth Amendment violation because the government has no probable cause or blanket warrant to view all communication from every citizen. Therefore, viewing all communication would be considered an unreasonable search.

However, if the government has probable cause to decrypt a specific piece of communication and receives a warrant from a court, then they could use the key and decrypt the communication. This is how the NSA operates under the Patriot Act. It collects mass communication data, and only examines the data on specific targets when it has a warrant from a Foreign Intelligence Surveillance Court. Using this process, the government does not violate the Fourth Amendment.

Problem 6

Section 222 prohibits the use of web browsing data by the carrier under some conditions, and allows it under other conditions. In particular, the section states: “Except as required by law or with the approval of the customer, a telecommunications carrier that receives or obtains customer proprietary network information by virtue of its provision of a telecommunications service shall only use, disclose, or permit access to individually identifiable customer proprietary network information in its provision of (A) the telecommunications service from which such information is derived, or (B) services necessary to, or used in, the provision of such telecommunications service, including the publishing of directories.” This paragraph means that an proprietary network information about the consumer, such as web browsing data, can only be used if it is necessary to provide the telecommunications service. Therefore, for example, my carrier cannot sell by browsing data to a third
party advertiser without my consent. They are, however, allowed to aggregate my data with other users and then release the aggregated data to all parties on “nondiscriminatory” terms.

The carrier is allowed to use my data under limited circumstances. These circumstances include calculating usage and billing for my web browsing, to protect the carrier from my unlawful use of the carrier’s subscription (such as fraud), or to provide inbound marketing or referrals if I initiate the call.


Problem 7

“Universal service is the principle that all Americans should have access to communications services.” - FCC

Ways to support Universal Service as per FCC goals:

1. **Companies connect high-cost areas such as rural, less developed areas:**
   Many companies such as Comcast are already incorporating initiatives such as Internet Essentials, to provide those with a low-income the internet at a cost they can afford, thereby allowing them and their family to contribute back to society. By doing this, companies are entitled to a part of the Universal Service Fund, which could be motivation to go ahead with the initiative to connect the people. However, unless the company is a monopoly or near monopoly, they may not be able to provide this service to many people without facing losses. Monopolies or near-monopolies would be able to make up for this cost by charging people of the other market segment a higher cost, also known as price discrimination. Also, people have to be accepted by the particular company/program in order to qualify for the same, and their guidelines may be a bit too specific. These programs also exist for phone services.

2. **Internet Companies and Funds to connect schools and libraries:** The Internet Essentials program does this as well, connecting over 49,000 schools in the year 2015. By connecting schools and libraries, students that cannot afford access at home, can use these facilities to do their schoolwork and learn thereby bridging the success rate of students who use the internet and students that don’t. The disadvantage would be that the student would only have access for limited amount of time, as such places have a fixed closing time. There are many entities that can support schools and libraries such as internet companies, NGOs, public organizations, and funds from the FCC itself. In addition to the internet, libraries and schools should be equipped with phone services including local and international calling at fixed rates, so that people with low-income need not pay rates for the entire month (e.g. ERate).

3. **Provide low-income support for people who cannot afford services:** The FCC has funds for low-income people to assist them with paying their monthly bills, for example the Lifeline program. If not the entire amount, people with low income, provided they meet an eligibility criteria (much wider than that of internet
essentials), get entitled to a discount for telephonic services. Furthermore, many agencies in rural areas help provide communication services for people in the same area, for example rural health services. This implementation is solely based on the funds available with the agency or provider at the given point of time. The advantage however, is that there is absolutely no burden on the low income class.