# CPSC155b: First Hour Exam

(February 8, 2001)

Instructions: Choose four of the following seven questions and give complete (but brief!) answers to these four. Each correct answer is worth 25 points. Do not answer more than four questions. If you do answer more than four, the first four answers that you give will be graded, and the rest will be ignored.

Question 1: What are ``network effects'' (also referred to as ``network externalities'' in **Information Rules**, by Shapiro and Varian)? Briefly explain why they are exceptionally important in e-commerce. Give an example of a product or service that we have discussed in class or that has been covered in the assigned reading (or both) for which network effects were particularly important, and briefly explain how network effects were crucial to the success or failure of the product or service.

Question 2: An important fact about the design of the Internet as a communication network is that ``the intelligence is at the endpoints.'' In this way, the Internet is fundamentally different from a traditional telephone system, in which ``the intelligence is in the network.'' Briefly explain what it means to say that the intelligence is at the endpoints and why the fact that the intelligence is at the endpoints in the Internet can create great opportunity for e-commerce inventors and entrepreneurs. Give an example of a product or service that we have discussed in class or that has been covered in the assigned reading (or both) for which this Internet design principle was particularly important, and briefly explain why intelligence at the endpoints was critical to the success or failure of the product or service.

Question 3: There are many ways in which creators and owners of intellectual property can benefit from their ownership rights, and there are a wide variety of technical and non-technical means that creators and owners can use in their efforts to exploit their ownership rights. For each of the following three scenarios, give a combination of technical and non-technical means that you believe will help the owner or creator achieve his goals.

(a) (9 points) The creator is a young scientist whose primary goal is to achieve recognition within his research community. The most prestigious journal in his field is published by a non-profit professional society that does not require authors of articles to transfer copyright of the individual articles to the publisher.

(b) (7 points) The owner is a major movie studio, and the work is a mass-market, big-budget film.

(c) (9 points) The creators are talented, not very well known, independent software developers. The work is an innovative PC application. If this application becomes popular, the creators can foresee developing many later versions with additional functionality and many related products.

Question 4:

(a) (12 points) **The Digital Dilemma** makes the following point (in Chapter 1, on page 32) about digital works and the way they are used on the Internet: ``*Content Liberated from Medium*: Information in digital form is largely liberated from the medium that carries it. When information is sent across networks, there is no need to ship a physical substrate; the information alone flows to the recipient.'' What is the ``first-sale rule'' in copyright law? Why has the first-sale rule been an effective tool for maintaining a balance between the needs of rights holders and the needs of society as a whole with respect to analog works such as books, paintings, and LPs? How does the fact that digital documents are ``content liberated from medium'' on the Internet make the first-sale rule potentially less effective as a tool for maintaining this balance with respect to digital works?

(b) (13 points) **The Digital Dilemma** also makes the following point (in the Executive Summary, on page 6): ``*Copying and Access*: In the digital world, even the most routine access to information invariably involves copying: Computer programs are run by copying them from disk to memory, … and Web pages are viewed by copying them from a remote computer to the local machine.'' Briefly explain why this fundamental connection between copying and access may make traditional copyright law less effective in maintaining a balance between the needs of rights holders and the needs of society at large in the digital world than it has been in the analog world. Give at least one specific example of an element of copyright law that should be re-evaluated in view of this intimate connection between copying of and access to digital works.

Question 5: [**The points associated with the 3 parts of this question sum to 20, not 25, because they were from an earlier version of the exam in which each question was worth 20 points total. This was an editing/proofreading error on my part. If you answered this question, you were graded according to the points listed on the exam, and then your total for this question was multiplied by 1.25. – JF]** Recall that the functionality provided by an encryption scheme is the ability to scramble information so that it is not understandable or usable until it is unscrambled. In an Internet-based content-distribution business, an encryption scheme can serve the needs of distributors by ensuring that a thief who intercepts a (scrambled) digital work while it is in transit between a merchant site and a paying customer's site cannot use the intercepted work, because he does not have the decryption key needed for unscrambling. An encryption scheme can serve the needs of customers by permitting them to transmit their order and payment information in scrambled form and to store the documents they've purchased in scrambled form. For each of the following three security technologies, state the functionality that it provides and at least one way in which it can serve the needs of distributors and customers in an Internet-based content-distribution business.

(a) (7 points) Digital signature scheme
(b) (7 points) Public-key certificate
(c) (6 points) Digital watermarking scheme

Question 6: Recall that there are four major ``layers'' of Internet protocols: The transport layer, the physical layer, the IP layer, and the application layer.

(a) (5 points) What is the ordering of the layers? That is, which is the ``lowest'' layer, which is built directly ``on top of'' the lowest, which is built directly on top of the second-lowest, and which is built directly on top of the third-lowest?

(b) (4 points) Which layer is most central to the way the Internet works and has changed the least during the years that the Internet has been in use?

(c) (4 points) Which layer is the HTTP protocol part of?

(d) (4 points) Which layer is the TCP protocol part of?

(e) (8 points) How do the architectural principle of layering and the existence of open protocol standards facilitate the development of e-marketplaces and e-commerce products and services?

Question 7: Recall that browser-based retail shopping over the Internet facilitates the collection of large amounts of customer data by many merchants and by the strategic partners of those merchants.

(a) (8 points) Briefly explain why large-scale collection of data about the web-shopping habits of customers can be both helpful and harmful to merchants.

(b) (8 points) Briefly explain why such data collection could be both helpful and harmful to customers.

(c) (9 points) A cliché that has been repeated many times during the brief history of Internet-based retail is that ``basically, the Internet empowers consumers.'' The point of view expressed by this cliché is that the advantages that the Internet confers on consumers outweigh those that it confers on merchants, that the ``balance of power'' has shifted toward the consumer, and that consumers will inevitably have better prices, better quality, and more choices available to them in the Internet Age than they did in the Mall Age. Do you agree? Briefly explain why you agree or disagree.