Final Exam
December 18, 2001

Instructions: Answer exactly 12 of the following 14 questions. Do not answer more than 12. If you answer more than 12, the first 12 answers in your blue books will be graded, and the rest will be ignored.

Note that 12 questions worth eight points each add up to 96 points. Everyone gets four points for free.

Please remember to put your name and e-mail address on the cover of your blue book(s).

Question 1: Open Source / Free Software

(a) (4 Points) For a computer program to satisfy the Free Software Foundation's definition of "free software," users of this program must be free to do four things with it. What are these "four freedoms?"

(b) (2 Points) True or false: Copylefted source code cannot be sold.

(c) (2 Points) Give two examples of "open-source" programs that are widely used.

Question 2: Copyright Law

(a) (4 Points) What is the First Sale Rule, and why might it be less effective as a means of regulating digital objects such as software and MP3 files than it is as a means of regulating physically embodied works such as books and CDs?

(b) (2 Points) True or false: In order to be guilty of violating the Digital Millennium Copyright Act, one has to be guilty of copyright infringement.

(c) (2 Points) What is the (possibly fatal) flaw in the following argument? "It is illegal to distribute copyright material protected by a TPS that effectively prevents copying, because, under the Fair-Use Doctrine of US copyright law, I have a right to make copies for certain purposes."

Question 3: Internet Architecture

(a) (4 Points) What are the four major layers of the Internet architecture, and what is the order of these layers? By "what is the order," I mean 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) (2 Points) The architectural principle of layering is a key enabler of e-commerce because:

i. Technical innovation and commercial deployment of new products and services can take place on each layer independently, without overall network redesign.
ii. It prevents abuse of monopoly.
iii. It prevents misuse of personal information that is collected in the course of web-retail transactions.
iv. None of the above.

(c) (2 Points) Give an example of a company whose initial success demonstrates the power of the Internet architecture.

Question 4: B2C Commerce

(a) (2 Points) One of the main reasons that first-generation B2C commerce seemed so promising was that it held out the hope of significantly lower prices for consumers. Why was it widely believed that online retailers could offer significantly lower prices than B&M retailers and still be profitable?

(b) (2 Points) True or false: Customers of successful online retailers typically experience significant switching costs.

(c) (2 Points) True or false: B2C companies are more dependent on massively scalable and continuously available operations systems than C2C companies.

(d) (2 Points) Which of the following strategies currently seems most promising for B2C e-commerce?

i. Diversification into more low-margin products
ii. Expansion into international markets
iii. Multi-channel retailing
iv. Increased advertising

Question 5: Information Economy

(a) (3 points) What are "network effects?"

(b) (3 points) What is "bundling?"

(c) (2 points) The following strategies and tools are commonly used by information businesses: differential pricing, versioning, technical-protection measures (*e.g.*, encryption), legal-protection measures (*e.g.*, copyright), branding, and sale of complementary products. Which property of information products do all of these strategies and tools address?

i. High fixed costs and low marginal costs
ii. The need for standardization
iii. The need for cross-platform compatibility
iv. All of the above

Question 6: Peer Production

(a) (2 Points) Give an example of peer production that predates the Internet.

(b) (2 Points) Give two Internet-based companies whose business models involve "leveraging peer production."

(c) (2 Points) Whether peer production is an effective way of accomplishing a particular task depends on the task's:

i. modularity.
ii. granularity.
iii. cost of integration.
iv. all of the above

(d) (2 Points) Two necessary preconditions for Benkler's vision of peer production are:

i. strong property rights and corporate hierarchies.
ii. information security and digital identity.
iii. low-cost communication and low-cost access to information.
iv. strong property rights and free markets.

Question 7: Privacy

(a) (4 points) According to Lessig, there are four major ways in which "privacy is protected in real space." What are they?

(b) (2 points) P3P provides:

i. a machine-readable format in which privacy policies can be encoded.
ii. enforcement mechanisms that ensure that web retailers comply with their posted privacy policies.
iii. enforcement mechanisms that ensure that web retailers comply with the OECD Fair Information Principles.
iv. a mechanism for customers to use web-retail services anonymously.

(c) (2 points) The purchase by DoubleClick of Abacus Direct was viewed as a serious privacy threat. Which key aspect of online data collection triggered this controversy?

i. Data are often collected silently.
ii. Users are not always given meaningful choices about data collection.
iii. Data collected by web retailers is often used to create "obnoxious" targeted ads.
iv. Data collected from many different sources can be merged; in particular, data collected online can be merged with data about users' "real space" lives.

Question 8: Miscellaneous I

(a) (2 Points) Give one advantage and one disadvantage of the widespread use of cookies.

(b) (2 points) Give two inherent difficulties with online ads.

(c) (2 Points) Yahoo's main sources of revenue are:

i. subscription fees and transaction fees.
ii. web services.
iii. advertising and business services.
iv. none of the above

(d) (2 Points) Give two of the tools typically used by venture capitalists in the due-diligence process.

Question 9: C2C Commerce

(a) (2 points) What is eBay's business model?

(b) (2 points) As discussed in class, eBay benefits from significant network effects. True or false: These network effects apply only to its C2C auction service, *e.g.*, its C2C fixed-price sales do not benefit significantly from network effects.

(c) (2 points) Which initially wildly popular but now apparently defunct Internet service has a very similar structure to that of eBay?

(d) (2 points) True or false: eBay sellers must use the ascending-bid auction that is technically equivalent to a 2nd-price, sealed-bid (Vickrey) auction.

Question 10: B2B Commerce

(a) (2 points) Give one example of a vertical B2B exchange and one of a horizontal B2B exchange.

(b) (2 points) Recall that two significant disadvantages of participant ownership of B2B exchanges are that it creates barriers to entry for new players and niche players and that it raises myriad anti-trust issues. Give an example of an alternative to participant ownership. That is, who else might plausibly own the exchange?

(c) (2 points) Recall that XML, a data-exchange language developed to overcome the "eyes-only" design limitations of HTML, is the basis for B2B-technology development based on the "document-exchange" framework for doing business. Which of the following is a data-exchange language precursor to XML?

i. SOAP
ii. EDI
iii. UDDI
iv. WSDL

(d) (2 points) Give two revenue models for B2B exchanges.

Question 11: Miscellaneous II

(a) (2 points) Yahoo's business model is currently most similar to the business model of:

i. DoubleClick.
ii. Google.
iii. Amazon.
iv. Microsoft.

(b) (2 points) A lead venture capitalist often demands one or more seats on the board of directors of the company it is funding. Give two other rights typically demanded by lead VCs.

(c) (2 points) Clark and Blumenthal explain why various requirements of relatively new stakeholders can be difficult to reconcile with the original "end-to-end design principles" of the Internet. Give an example of such a requirement and the stakeholder that claims to require it.

(d) (2 points) What is the difference between a "business model" and a "revenue model?"

Question 12: Web Searching

(a) (3 points) What is Google's business model?

(b) (3 points) Google's effectiveness as a search engine stems partly from the number of pages it indexes (more than 1.6 billion) and partly from the PageRank algorithm, which uses the link structure of the web. In essence, how does PageRank use links?

(c) (2 points) The "lifetime of a query" processed by Google starts when a user enters a query on a web form that is sent to the Google web server. From the web server, the query is sent to the Index-server cluster. Which of the following tasks is performed by the Index-server cluster?

i. Retrieval of documents
ii. Caching of documents
iii. Matching of queries to documents
iv. Construction of document abstracts

Question 13: Online Content Distribution

(a) (2 points) What are the main products or services of RealNetworks, and who is its main competitor?

(b) (4 points) What is the Street-Performer Model for online content distribution?

(c) (2 points) "Good enough" compliance with current US copyright law is more difficult to achieve online that it is in "real space" because of:

i. "loopholes" in current US copyright law.
ii. lack of online privacy.
iii. market failure of electronic-cash technology.
iv. the fundamental nature of computers, networks, and digital documents.

Question 14: Web Services

(a) (2 points) Identification, Search, Calendaring, Notification, and Personalization are examples of:

i. data islands.
ii. .NET foundation services.
iii. smart clients.
iv. XML document-type definitions.

(b) (3 points) Why are "DRM-like solutions" likely to be deployed in attempts to provide data privacy for web-service users? (Here "DRM" stands for Digital-Rights Management.)

(c) (3 points) Describe a general strategy for turning a publicly accessible data repository into a web service.