Second Exam
April 24, 2003

Instructions: Answer exactly six of the following seven questions.

Do not answer all seven questions. If you write answers for all seven questions, clearly mark which answer should be ignored. If you answer all the questions and do not cross out one of them, the first six answers in your blue book(s) will be graded, and the seventh will be ignored.

Each question is worth 16 points. Note that 6 questions worth 16 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).

This exam has 1 pages including this one. Please make sure you have all the pages before the exam starts. The questions start on the next page. Begin when you are told to do so.

Question 1 (16 points): Internet Basics

A. (6 points) For two points each, identify each of the following as a property of the Internet, the telephone network, or both.

(i) New products and services can often be introduced unilaterally by their inventors.
(ii) There is a long-standing, established technological and legal framework for cooperation with law enforcement and other government agencies.
(iii) Differential pricing is often used by network-service providers and others who sell products and services on the network.

B. (2 points) True or False: Both BGP and OSPF are protocols used for inter-domain routing.

C. (4 points) For one point each, match each item in the left-hand column with the item in the right-hand column most closely associated with it.

Browsers	IP layer
Packet routing	UDP
Reliable byte streams	TCP
Non-reliable byte streams	Application layer

D. (2 points) Which of the following Internet design goals is furthest from having been fully met?

(i) survivability in the face of failure
(ii) support for multiple types of communication services
(iii) accounting for resources
(iv) accommodation of a variety of network types

E. (2 points) When trying to download content from a website, your browser may be unable to connect to the local name server, or the local name server may be unable to connect to some other name server further up in the DNS name-server hierarchy. However, the download may succeed anyway. Why?

(i) There may be multiple paths in the Internet between your PC and that particular website.
(ii) Both your browser and the local name server may perform IP-address caching.
(iii) The website may use VeriSign certificates to establish online identity and prevent spoofing.
(iv) None of the above.

Question 2 (16 points): Portals

A. (6 points) What is Yahoo's business model?

B. (2 points) Which of the following companies has a business model that is most similar to that of Yahoo?

(i) Google
(ii) VeriSign
(iii) eBay
(iv) RealNetworks

C. (2 points) Which of the following has been most directly comparable to and competitive with Yahoo?

(i) Covisint
(ii) eBay
(iii) Amazon
(iv) MSN

D. (2 points) True or False: Unlike many dot-com companies that arose later in the Internet boom, Yahoo had a proven track record with a solid user base before it went public.

E. (4 points) Do you think that there is an offline analog of a portal? If so, give a type of mass-market, offline business that you think is analogous and explain briefly why you think it is analogous. If not, explain briefly which features of a portal make it something fundamentally new in the mass-market business world.

Question 3 (16 points): Peer Production and Open Source

A. (4 points) What does Benkler mean by "peer production?"

B. (2 points) In Benkler's vision, the success of a peer-produced project is limited by

(i) the extent to which the project exhibits modularity, fine granularity, and low integration costs.
(ii) the access that the peer group has to investment capital.
(iii) the overall technical complexity of the project.
(iv) the ability of the peer group to enforce its property rights.

C. (2 points) Give an example of a sphere of human endeavor in which peer production has succeeded that is *not* open-source software.

D. (4 points) What is "copyleft?"

E. (2 points) True or False: A single company might use both traditional and open-source licenses as part of its overall business strategy.

F. (2 points) In addition to operating systems, successful open-source programs can be found among

(i) web servers.
(ii) software-development toolkits.
(iii) user interfaces.
(iv) all of the above.

Question 4 (16 points): Searching and Google

A. (4 points) What is the "abundance problem?"

B. (2 points) True or False: Google's business is technically commoditizable, and the main reason that Google is so profitable is that it benefits from strong network effects.

C. (2 points) The number of web pages that Google indexes is approximately

(i) 30 million.
(ii) 300 million.
(iii) 3 billion.
(iv) 30 billion.

D. (4 points) During its lifetime, a query submitted to Google encounters the Google Index Server, the PageRank algorithm, a web form, and the Google Doc Server. In what order does the query encounter these four components?

E. (2 points) Google's searching and ranking technology is so successful because, in addition to analyzing the content of pages, it makes use of

(i) the knowledge encoded by the link structure of the web.
(ii) directories compiled by human experts.
(iii) both (i) and (ii).
(iv) neither (i) nor (ii).

F. (2 points) True or False: In the context of a single query, a page can have both a high hub score and a high authority score.

Question 5 (16 points): Miscellaneous

A. (2 points) True or False: "Authentication" is synonymous with "authorization."

B. (4 points) What is an "attestable trusted-computing base?" (Hint: The term arises in the context of rights management and policy control of network-distributed data.)

C. (4 points) For one point each, give four examples of rights typically demanded by venture capitalists when they fund a company.

D. (4 points) What are "foundation documents," and why are they problematic in the context of identity management?

E. (2 points) Which licensing language currently under development is used, *e.g.*, in several Microsoft products that require policy control of PC-resident content?

Question 6 (16 points): Web Services

A. (2 points) Which of the following standard protocols is used to specify how a web service exchanges messages with its customers?

(i) UDDI
(ii) HTML
(iii) XrML
(iv) WSDL

B. (2 points) Identification, Search, Calendaring, Notification, and Personalization are examples of

(i) smart clients.
(ii) data islands.
(iii) .NET foundation services.
(iv) XrML licenses.

C. (4 points) Which Internet architectural principle underlies the design of the .NET framework?

D. (4 points) Which classic revenue source for web-based B2B services cannot be used in the design of web-service business models?

E. (4 points) Why are DRM technologies potentially applicable to the protection of private user data in web services?

Question 7 (16 points): E-Mail Abuse

A. (4 points) What is an open mail relay?

B. (3 points) What is a CAPTCHA? (Do not expand the acronym; instead, briefly explain the basic idea behind it.)

C. (3 points) Briefly explain how companies like Yahoo attempt to use CAPTCHAs to reduce e-mail Spam.

D. (3 points) Which of the file types in the list below (*a*–*e*) can contain a virus or malicious code? Choose one of the following combinations (i–v) as your answer:

(i) All of *a*–*e*
(ii) Only *b*–*e*
(iii) Only *b*–*d*
(iv) Only *b*, *c*, and *e*
(v) Only *b* and *c*

a. MP3 music files
b. Microsoft Word documents
c. Windows executables (EXE)
d. Screensavers
e. Internet picture files (GIF or JPEG)

E. (3 points) For one point each, choose one of *a*–*e* from the list below to describe how each of the following types (i–iii) of viruses or malicious code replicates:

(i) Worm
(ii) Macro virus
(iii) File infector

a. Does not replicate
b. Copies itself to areas within executable files
c. Copies itself to system sectors on disks
d. Copies itself to document files and document templates
e. Copies itself to other machines using network protocols