Homework 3

This assignment is due in class on November 6, 2001. It covers lectures through October 30, 2001 and readings through November 6, 2001 (*i.e.*, the readings assigned for Dr. Cranor's lecture). Late homework will not be accepted.

Please write your name, email address, and date on the paper you turn in.

Question 1.

(25 points): Venture Capital
   (a) (12 points) For four points each, name the three basic types of VCs, define each type, and give one major motivation for each type.
   (b) (1 point) Which of the three types of VCs given in your answer to part (a) is the most common?
   (c) (4 points) In order to obtain venture capital, an entrepreneur often has to cede a huge amount of control and equity to the VC. Why do entrepreneurs do this, rather than obtaining necessary capital by getting a bank loan?
   (d) (8 points) Consider Bob-soft.com, a new company with first-round funding from one VC firm. In this first round, Bob (the founder) owns 100 shares, and the VC owns 100 shares; these are priced at $1 per share. In a subsequent bridge round, the founder issues 10 additional shares, priced at $0.20 per share. Under the terms of the first round of funding, the first-round VC has "anti-dilution protection." Compute both the new total number of shares and the new number of shares owned by the first-round VC if these numbers are obtained using a weighted ratchet. Compute both if they are obtained using a full ratchet.

Question 2.

(15 points): B2B marketplaces
   (a) (10 points) Define* the terms "vertical B2B" and "horizontal B2B." Give an example of each.
   (b) (5 points) In order to reach their full potential as enablers of efficiency and growth in the 70% of the US economy that is business-to-business commerce, B2B electronic marketplaces must
         i.   Meet significant remaining technical challenges in development and deployment of XML-based marketplace technology
        ii.   Allay significant anti-trust concerns
       iii.   Prosper in or at least survive an economic slowdown characterized by disillusionment with technology
        iv.   Convince small firms whose participation is crucial that B2Bs will do something for them except squeeze their margins.
         v.   All of the above

*Don't just expand the acronym "B2B" to "business-to-business." I know that you know that. Give an actual definition of each item.

Question 3.

(20 points): C2C Internet Services
  (a) (4 points) Describe eBay's original, basic business model.
  (b) (6 points) For three points each, describe two services that eBay now provides that were not part of its original model.
  (c) (10 points) As discussed in class, the two most prominent examples to date of C2C Internet services are eBay and Napster. They have some important similarities, *e.g.*, the fact that both are almost perfect textbook illustrations of the power of "network effects." Why is one spectacularly successful and the other apparently defunct?

Question 4.

(20 points): Privacy
  (a) (4 points) True or False: P3P can enforce companies' compliance with their own privacy policies.
  (b) (12 points) According to Lessig, there are four major ways in which "privacy is protected in real space." What are they (for three points each)?
  (c) (4 points) True or False: Lessig argues that simply giving individuals property rights over their personal data will increase privacy (or at least preserve the whatever privacy these individuals now have).

Question 5.

(25 points): XML and Document Types

Document exchange is a natural way to think about doing business. Business interactions can often be represented by an exchange of XML documents. For example, ordering something from a manufacturer involves the following interaction:

> Buyer sends Manufacturer a *purchase order*.
> Manufacturer sends Buyer an *invoice* for the order.

In the above example, the *purchase order* and *invoice* are the documents exchanged, and the information contained in these documents represents the order requested and fulfilled. To automate this process, the computers that are handling the exchange of information must be able to *parse* the documents and extract the contents in a useful form.

XML allows content in a document to be *tagged*, identifying what information is being given. For example, the line "10/30/2001" may be tagged in a purchase order as the date the request was made. XML documents reference a *Document Type Definition*, or DTD, which gives the rules for what tags are allowed and what content may be contained in each tag. Using the same example, a DTD for the purchase order may contain a rule that every purchase order must contain a request date, specified by the tag `<date>`, and that the date is given by three numbers representing the month, day, and year of the request. Given a DTD, an *XML parser* can obtain and process information from the XML document in a useful way.

Here is an example business exchange:

> A customer calls the Acme Radio Company and says, "I would like a
> radio that gets both FM and AM stations, has an alarm, and costs less than
> $30. Can you send me a list of radios like that?"

This exchange can be automated by an exchange of XML documents. The *information request* and *catalog* are two documents in the exchange above. The request can be used to ask about products; the catalog can be used to list the products meeting the specs of the request. A DTD for one of these documents describes the type of information contained in it. The following is an example DTD for the information request:

```
<!DOCTYPE INFOREQUEST [
<!ELEMENT request (minprice?, maxprice?)>
<!ELEMENT minprice (#PCDATA)+>
<!ELEMENT maxprice (#PCDATA)+>

<!ATTLIST request

    band (FM | AM | both) 'both'
    alarm (yes | no) #IMPLIED
    cd (yes | no) #IMPLIED
>

<!ATTLIST minprice currency CDATA #REQUIRED>
<!ATTLIST maxprice currency CDATA #REQUIRED>
]>
```

The <!DOCTYPE *name* […]> declaration gives the definition for the document type *name*. The brackets contain the elements (and their specifications) used in the document.

The <!ELEMENT *name* (*contents*)> declaration specifies a way to tag information with *name*. The *contents* field indicates what the element can contain (*i.e.*, what content can legally be tagged with the element name). The contents can be other elements, or a character string, or both. Note the following conventions:
- #PCDATA means a character.
- + means one or more occurrences, so (#PCDATA)+ means one or more characters, *i.e.*, a character string.
- * means zero or more occurrences.
- ? means optional. minprice? means that the element minprice may be present one or zero times.

Each element can also have an <!ATTLIST *name list*...> declaration to go along with it. This specifies the attributes assigned to every tag. Consider the element minprice, which is used to tag the lower end of the price range. The element contents may just be a number. A required attribute for this element is currency, the unit of the amount provided. (Without it, <minprice>10</minprice> could mean 10 dollars or 10 cents.)

Note the following conventions:
- CDATA means a character string.
- #REQUIRED means that the element tag must contain a value for the attribute. For example, a minprice tag without a currency attribute (*e.g.*, <minprice> as opposed to <minprice currency="dollars">) is not allowed.
- #IMPLIED means that the attribute is not required.
- (*value1* | *value2* | …) means that the attribute can be one of the values in the list, specified by *value1*, *value2*, etc. If there is a value after the parentheses, that is the default value assumed if the attribute is not given. In the above, a request tag with "band=…" omitted would be assumed to have "band=both" specified.

So given the above DTD, here is an example XML information request document that follows it:

```
<request band='both' alarm='yes'>
      <maxprice currency='dollars'> 30 </maxprice>
</request>
```

Tagged content starts with *<name>* and ends with *</name>*.

For a more detailed explanation of XML and examples of XML documents and DTDs, follow the links on the class web page to the following documents:
- "Examples of Document Type Definition in XML," Sheng Zhong, Yale University, March 2001 (http://www.cs.yale.edu/~vijayr/cs155/ex-xml.pdf)
- Lecture notes from Robert Glushko's invited talk last semester (http://www.cs.yale.edu/~jf/glushko.pdf)
- xCBL DTD samples from the XML Common Business Library (http://www.xcbl.org/xcbl30/DTD/sample/dtdsampleslink.html)
- O'Reilly XML.Com reference guides and articles. (http://www.xml.com)

Consider the following business exchange:

> A customer calls a contact-lens manufacturer and says, "I looked in your catalog and found a contact lens I want to order. If I send you a purchase order and a prescription, when will I receive an invoice with the order confirmation and expected shipping date?"

(a) For five points each, identify three XML document types in the above exchange.
(b) (5 points) Give a DTD for one of the types you mentioned in part (a). Include tags for information you think should be present in the document.
(c) (5 points) Give a sample XML document using the DTD you wrote in part (b).