Intellectual Property

Alan Clements
University of Teesside

Introduction to Intellectual Property

This lecture looks at the nature of intellectual property and the various forms of protection afforded to intellectual property (e.g., patents).

In particular, we introduce the problems of intellectual property in the information age. Today, the Internet allows unlimited copying and distribution of books, images, music and software.

Property Rights

Before looking at intellectual property, let's look at where property rights come from. Herman Tavani (in Ethics and Technology) states that there are three philosophical basis for the concept of property.

Theory	Result
Labor	Property is a natural right that is justified in terms of the labor invested in creating property.
Utilitarian	Property is not a natural right, but an artificial right created by the state. Property rights are granted by the state because they result in greater overall benefit to society.
Personality	Property is a moral right and is justified because a creative work expresses the personality of its creator.

Two types of Property

- Physical property – land, money, houses, clothes, food.
- Intellectual property – ideas (expressed as designs, music, art, writing, dance, *software*). Intellectual property is ***intangible***.

Difference between physical and intellectual property

- Physical property is expensive to create and to reproduce; for example, houses, automobiles, diamonds.
- Intellectual property may take a lot of effort to create (e.g., a book) but is easy to reproduce at minimal cost.
- Historically, societies have attempted to protect intellectual property by giving designers special privileges.

Types of Intellectual Property

- Patent
  - Protects inventions
- Trademark
  - Protects traders: those who sell products
- Trade secret
  - A trade secret is a critical piece of information that an organization wishes to keep secret
- Copyright
  - Protects writers and artists

Patents

Patents grant an inventor the right to exclude others from producing or using his or her discovery for a limited period of time.

Society grants a patent in return for the inventor revealing ("teaching") details of the invention.

The invention must satisfy three criteria:

- usefulness
- novelty
- non-obviousness

A patent is granted to someone who can demonstrate that their invention would not be obvious to someone "ordinarily skilled in the art" (non-obviousness)

After 20 years, a patent expires and anyone can freely exploit the invention.

After 20 years a patented drug can be made by any manufacturer and becomes known as a generic drug.

The First Patents

From the UK patent office website

Britain has a very long patent tradition in the world. Its origins can be traced back to the 15th century, when the Crown started making specific grants of privilege to manufacturers and traders. Patents were signified by Letters Patent, open letters marked with the King's Great Seal.

The earliest known English patent for invention was granted by Henry VI to Flemish-born John of Utynam in 1449. The patent gave John a 20-year monopoly for a method of making stained glass, required for the windows of Eton College.

Trademark

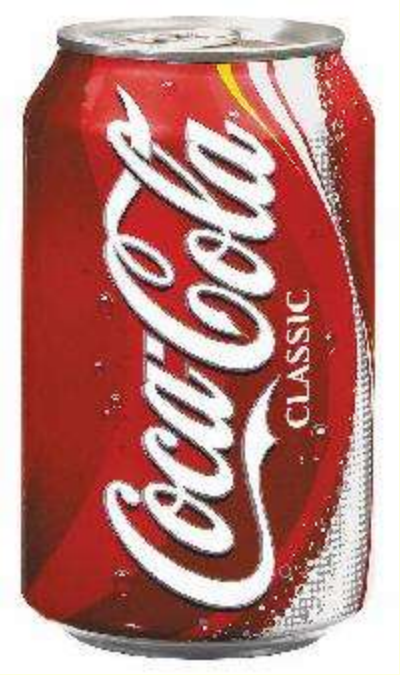
A trademark is a distinctive symbol that traders use to identify their products.

Two of the most famous trademarks in the world are the Coca-Cola and McDonald symbols.

A trademark is very valuable to a manufacturer because it is a shorthand for their products and their assumed reliability and quality.

The nature of a trademark may vary; it may be a symbol, word or picture. Trademarks may even extend to distinctive styles and color in packaging.

AOL attempted to trademark the expression "You've got mail" and failed.



Trade Secrets

A trade secret is a piece of information that provides an organization with a competitive advantage over other companies; for example, formulae, plans, manufacturing processes.

A good example is the formula for Cola Cola.

A company's projected sales figures may constitute a trade secret because that information is valuable to a competitor.

It is illegal to reveal a trade secret.

Trade Secrets – Different from Patents

A trade secret does not have a finite lifetime like a patent. A trade secret may be ‘forever’.

A trade secret may be circumvented by independent research carried out by a competitor.

Non-disclosure Agreement

A non-disclosure agreement, NDA, is commonly used to protect a trade secret when one of the parties is not part of the company owning the trade secret.

For example, an author may be provided with details about a company's future product because the book will appear at the same time as the product hits the market. The author will be asked to sign an NDA to ensure that details of the product (trade secret) will not be prematurely disclosed.

Copyright

Copyright originally applied to the written word and was designed to protect the copyright owner by giving him or her "the exclusive right to reproduce, distribute, perform, display, or license their work". Copyright lasts for the lifetime of the owner plus 50 years (70 years in the UK but 50 for sound recordings and broadcasts). Note – the fine details of copyright duration are rather more complex.

Copyright can now be applied to graphic art, sound recording, and motion pictures.

Copyright extends to:

Literary works
Computer software
Musical work
Sound recordings
Drama
Motion pictures
Visual works: statues, paintings, graphic works
Choreographic works
Exclusions (not copyrightable):
- Non-tangible works
- Ideas
- Facts
- Names, slogans, formulae, equations

Copyright and Digital Technology

- Until the arrival of digital technology in the 1960s and its expansion into the domestic world in the 1990s, most electronic technologies were analog. That is, signals could have an infinite number of values within a range.
  - Analog signals are difficult to process faithfully and to store. Successive copying degrades analog signals.
- Digital signals have fixed values and can be copied and stored an infinite number of times with no loss of quality.
- The unauthorized copying of analog signals posed a modest threat to copyright owners because *copies-of-copies-of-copies*… degrade rapidly. The ability to copy digital material perfectly means that a copy is as good as an original.

Copyright and Plagiarism

- Copyright is a system designed to protect those who create original works.
- Plagiarism is the act of passing off the work of others as your own. In the academic world, plagiarism is regarded as the number one sin.
- You can commit plagiarism without breaking copyright (e.g., copying something that is in the public domain).
- You can infringe copyright without committing plagiarism (e.g., you can acknowledge the work you copy as belonging to someone else but that does not give you the right to do it).

History of Copyright

1557 Queen Mary I gives control of all printing and bookselling to a single guild, the Stationer's Company.

1662 The Licensing Act establishes a register of licensed books.

1710 The first copyright law grants exclusive rights to authors, rather than publishers. Rights were limited to 28 years before they passed into the public domain .

1787 the US Constitution states "the Congress shall have power . . . to promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries”

1886 The Berne Convention provides a scheme to allow the mutual recognition of copyright between nations. This provides a universal law and removed the need for separate registration in every country. The United States became a Berne signatory in 1988.

1928 The Rome Act recognizes the moral rights of authors and artists, giving them the right to object to modifications of a work in a way that might prejudice or decrease the artists' reputations.

History of Copyright

1990 The Circulation of Computer Software Act (USA) prohibits commercial lending of computer software by libraries etc.

1996 the World Intellectual Property Organization (WIPO) allows the fair use of material in a digital environment and provides a balance between the rights of authors and education and research.

1998 The Digital Millennium Copyright Act launched in the USA. This implemented the WIPO Internet Treaties and permitted temporary copies of programs during computer maintenance.

DMCA "prohibits gaining unauthorized access to a work by circumventing a technological protection measure put in place by the copyright owner …".

Annæ Reginæ.

An Act for the Encouragement of Learning, by Vesting the Copies of Printed Books in the Authors or Purchasers of such Copies, during the Times thereinmentioned.

Whereas Printers, Booksellers, and other Persons, have of late frequently taken the Liberty of Printing, Reprinting, and Publishing, or causing to be Printed, Reprinted, and Published Books, and other Writings, without the Consent of the Authors or Proprietors of such Books and Writings, to their very great Detriment, and too often to the Ruin of them and their Families
For Preventing therefore such Practices for the future, and for the Encouragement of Learned Men to Compose and Write useful Books; May it please Your Majesty, that it may be Enacted, and be it Enacted by the Queens most Excellent Majesty, by and with the Advice and Consent of the Lords Spiritual and Temporal, and Commons in this present Parliament Assembled, and by the Authority of the same, That from and after the Tenth Day of April, One thousand seven hundred and ten, the Author of any Book or Books already Printed, who hath not Transferred to any other the Copy or Copies of such Book or Books, Share or Shares thereof, or the Bookseller or Booksellers, Printer or Printers, or other Person or Persons, who hath or have Purchased or Acquired the Copy or Copies of any Book or Books, in order to Print or Reprint the same, shall have the sole Right and Liberty of Printing such Book and Books for the Term of One and twenty Years….

Copyright and Fair Use

Copyright protects the creator of an original work by stopping unauthorized duplication.

Society suffers if people are denied access to material that they need for research or education.

Fair use has been defined to allow people to bypass the copyright law under certain circumstances; for example, criticism, comment, news reporting, teaching, scholarship and research.

Whether copying is fair use depends on:

- the purpose of the use – for commercial or nonprofit educational purposes;
- the nature of the copyrighted work;
- the amount of material copied in relation to the work as a whole.

The notion of fair use is poorly defined and individual cases can be challenged in court.

Myths about Copyright

- If it doesn't have a © symbol, it's not copyrighted
- If I give it away, I'm not infringing copyright
- Putting it on the web is fair use
- If I modify someone's article slightly, I'm ok
- I'm really doing then a favor by giving them free advertising

Copyright or wrong?

My friend has a program. Why shouldn't I copy it? It will save me a lot of money and no one will suffer; it's a *victimless* crime.

It is true that no one is worse off following the copying of a program. But the situation is rather more complex.

Cost of Copying

- A company exists to make a profit for its shareholders.
- A company invests in the creation of a new product. It is expected that the product will sell and generate more income than it cost to manufacturer.
- If the product is copied (*pirated*) the company may not generate the expected income. Indeed, the company may make a loss and go out of business.
- The dangers of copying may force a company to drop out of a specific market and society looses by not getting new products that might have been valuable.

Consequence of Copying

- Companies claim they loose a lot of money because people copy their books, software, music, CDs, DVDs etc.
- Suppose 100 students copy a piece of sophisticated software costing $500 per copy. The company will argue that they have lost $50,000. Such large sums of money make it worthwhile for companies to prosecute copyright violators.
- Although companies loose less per music CD than per software package, CDs are sold by the million and the lost revenue can be vast. Some companies sue individuals who copy music as a means of frightening others.
- Apart from being unethical and illegal, unauthorized copying can lead to a fine and, more importantly for a professional, a criminal record.

- Peer-to-peer file sharing (Napster) has made it easy to copy software on an immense scale.

A Comment from the Internet

- “The greatest reward musicians should have is their own music and nothing else. … Alfie Kohn reports on a psychological study showing that creativity diminishes if it's done for gain. He writes: ‘If a reward - money, awards, praise, or winning a contest - comes to be seen as the reason one is engaging in an activity, that activity will be viewed as less enjoyable in its own right’.

- … It follows then that the best music I've heard … is from artists, who are struggling to make ends meet working two jobs, who are doing their music with an inherent passion and a desire to share it with people, and not because they have a contract ...”

So why pay the heart surgeon? He or she should be grateful that they are lucky enough to save lives!

A Personal Example

- I wrote an 800-page textbook on computers. It took me more than three years.
- It is a specialized text and does not sell in tens of thousands. The income generated is modest and below the amount I would have received had I spend the same amount of time doing consultancy.
- I was asked to give a lecture to students taking a course based on my book. When I arrived, I found that all students had a large document that was a photocopy of parts of my book. The lecturer had done this to save the students the cost of a book.
- Had the students bought the book instead of using the copied version, I would have been $100 better off.

“Self-copying” and competition

- An interesting aspect of copying is demonstrated by self-copying where a company copies and freely distributes its own product.
- Consider Internet Explorer. Microsoft ***copies*** it and gives it free with Windows (this is called *bundling*).
- The effect of this self-copying is to make it difficult for competitors to compete with a product that is being given away.
- Self-copying locks out competitors and stifles innovation.
- Such practices may be illegal because they break laws designed to prevent anti-competitive practices.

Arguments for not having Copyright/IP

- IP adversely affects the poor, disadvantaged, developing world etc.
  - Not all can afford to access IP that is protected and, therefore, their development or progress is curtailed.
- IP restricts progress and development because the free flow of information is restricted.
- IP is strongly supported by the mass media because they gain most from restricting the flow of information (they have an effective monopoly).
- Laws designed to protect *physical* property should not be extended to *intellectual* property.
  - You can have only one copy of a specific house or car and its owner can suffer from its loss.
  - You can have multiple copies of a painting and the owner does not suffer its loss if someone else looks at the painting.
  - Society gains by the free exchange of idea, artwork, films, books etc.
- Patent law can be used to stifle invention and progress.
  - If an energy-efficient automobile engine were invented, the patent could be bought by gasoline companies to prevent its introduction and consequent effect on their profits.

Arguments for not having Copyright/IP

- Patent law can be used to steal information from traditional societies.
  - Knowledge developed over hundreds of years in developing countries can be patented and the fruits of this knowledge denied the very people who originated it.
- Copyright law can be used to suppress information
  - A government involved in a war was later embarrassed when official documentation was released. This documentation was used in a book revealing the government's complicity. The government claimed copyright on the documents to prevent their publication.
- Patent law can be applied to areas unforeseen by those who wrote the law
  - Genetic patents

Ethics and Professional Organizations

British Computer Society Code of Ethics is clearly incompatible with activities that breach the laws concerning IP.

- Members shall have due regard to the legitimate rights of third parties.

- Members shall ensure that within their chosen fields they have knowledge and understanding of relevant legislation, regulations and standards and that they comply with such requirements.

- Members shall uphold the reputation of the Profession and shall seek to improve professional standard… and shall avoid any action which will adversely affect the good standing of the Profession.

- Members shall act with integrity towards fellow members and to members of other professions with whom they are concerned in a professional capacity and shall avoid engaging in any activity which is incompatible with professional status

Special Rules for Computer Chips

(from the web) The Semiconductor Chip Protection Act 1984 (USA) is an extension of the Copyright Act that creates a hybrid between patent and copyright protection.

The Act was written because copyright protection does not extend to programs embodied in integrated circuits.

Software as Intellectual Property

- The production and distribution of computer software is a lucrative industry as a glance at Microsoft will reveal.
- Software, like the printed word, sound, and music, is expensive to create but can be reproduced at minimal cost.
- Because software can be immensely expensive to create, the ability to create copies of software is a considerable threat to the profitability of software companies.

Software and the Law

- The law concerning software is not clear and is still being formulated.
  - In the USA the Copyright Act was amended in 1980 to include software as a literary work.
- Software has some of the characteristics of literary works and some of the characteristics of engineered systems.
  - Consequently, software can be protected by both copyright and patent. Software can also be protected by trade secret legislation.
- The very nature of software challenges all previous notions of intellectual property.
  - The source code of software exists in text form and can be thought of as a literary work. However, the value of the software is in its function and not its form
  - The purpose of software is to perform a useful function which makes it more like an invention.
- Because software can be represented as a mathematical algorithm, it is not patentable (algorithms can't be patented).
- The software you "buy" is often obtained under license and you do not own it.

Software and the Law

- Software manufacturers developed the concept of look and feel.
- In 1986 Whelan v. Jaslow in New Jersey established that copyright protection extended to its non-textual aspects (That is, its so-called look and feel).
- In 1992 Computer Associates v. Altai partially reversed the earlier decision and allowed copying via reverse engineering. This judgment was echoed by the Sega v. Accolade case in 1992.
- In 1992 the US passed the Software Copyright protection act making it illegal to copy software. Prison terms up to 5 years can be awarded to anyone copying any combination of programs worth more than $2,500.

Software and DMCA

- The Digital Millennium Copyright Act has important implications for software copying as well as more conventional copying.
- The DMCA makes it illegal to circumvent any mechanism designed to prevent copying.
- In 2000 Universal City Studios v. Reimerdes established that selling software on the WWW designed to allow you to copy encrypted DVDs was illegal.

Software Piracy

- Software vendors distinguish between two classes of software piracy.
  - Commercial piracy is the large-scale copying of programs performed by illegal organizations.
  - Casual copying is small-scale piracy that takes place when someone gives a copy of a program to a friend.
- Software vendors have different strategies for dealing with these two classes of software pirates.
- A software vendor once sent out a form to people inviting them to apply for free software. This software searched machines for illegal copies of their software and subtly encoded the results in the “application for free software”. Some people were surprised to get visits from men in expensive suits.

Limiting Software Piracy

- Software vendors have attempted to deal with casual pirates in several ways.
- Some use special recording techniques on their media that introduce errors and prevent a computer performing the copying. Only a special boot program can load the software.
- Some vendors use codes that have to be entered at installation. The software checks whether the code is legal. Of course, there's noting to stop you copying the code.
- Some vendors supply the required product code via the phone which forces people to explicitly lie in order to copy software illegally.
- Microsoft uses product activation. A key with the software is combines with a key that is a unique function of your computer to create an new key. This key is sent to Microsoft to generate a third key that is unique to both the software and your computer. This third key enables the software. You cannot reuse the software without going back to Microsoft and personally explaining what you are doing.
- Spyware can be introduced to seek illegal software and report back to the software vendor anyone who installs software without a license.

Copy Prevention

- On 22 April 2005 a French court ordered DVD vendors to pull copies of the David Lynch film "Mulholland Drive" off store shelves.
- The appeals court ruled that copy prevention software on the DVD violated privacy rights in the case of one consumer who tried to transfer the film onto a video cassette for personal use.

DVDs and Region Encoding

DVDs can be ‘region encoded’ which means that a DVD encoded for region X can only be played on a player designed for region X. The world is divided into regions 1 to 6.

REGION 0 – All regions

REGION 1 -- USA, Canada
REGION 2 -- Japan, Europe, South Africa, Middle East, Greenland
REGION 3 -- South Korea, Taiwan, Hong Kong, Parts of South East Asia
REGION 4 -- Australia, New Zealand, Mexico and Latin America

REGION 5 -- Eastern Europe, Russia, India, Africa
REGION 6 -- China
REGION 7 -- Reserved for special use
REGION 8 -- Recovered for Cruise Ships, Airlines, etc...

You can buy a DVD in the USA that can be played in Canada but not in Mexico. A DVD bought in Japan can be played in England but not Taiwan.

Why have Region Encoding?

Region encoding is intended to prevent a worldwide free market in DVD. Applying a region code ensures that a DVD is released into a market at a time and at a price and with specific contents determined by the manufacturer.

For example, a DVD may be released in the USA six months after a film. If that film is released six months later in Europe, DVDs from the USA may reach the same market at the same time as the film. Region encoding ensures that this cannot happen.

However, it should be noted that any enthusiast can obtain multi-region DVD players Equally, basic DVD players are so cheap that it is possible to buy a second player just for region 1 DVDs.

A Comment off the Internet

A frustrated DVD user makes the following comment on alexbarnett.net. I don't expect to see a message on the back of my sandwich cautioning me that:

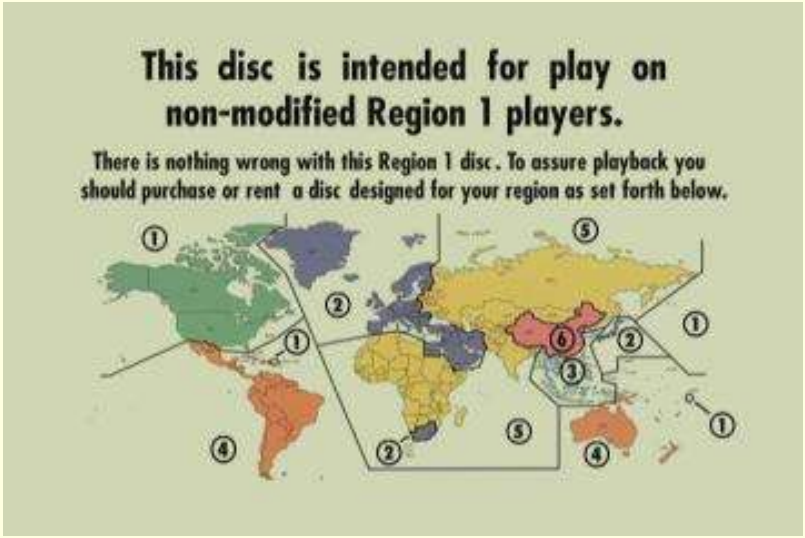
"You may not eat this product outside of the UK, although the mustard came from the US, so if you are thinking of eating the sandwich there you can eat the mustard, but nothing else. Especially the lettuce. Oh, and you can only eat the mustard 4 times if you are so inclined".

Region Encoding Enhancement

Regional encoding enhancement, RCE, provides an additional encoding enhancement that ensures disks from Region 1 (The USA and Canada) cannot be played in 'region-free' players.

RCE demonstrates that region encoding exists only to promote the interests of Hollywood.

Even RCE can often be defeated.



Region Encoding – Comments

Some regard region encoding as illegal at an international level because it violates the rules of free trade.

If regional encoding is used to stop a conflict between first-run films and DVDs, way is it that very old films are regionally encoded?

If you live in region X and a movie is regionally encoded for region Y ONLY, you cannot view that movie. This could be regarded as censorship.

What's Possible in the Future?

- Copyright holders, primarily large commercial organizations such as Sony and Hollywood want copying made more difficult.
- You cannot copy commercial DVDs because the copying device manufacturers (sometimes the same people) install mechanisms that will not record copyrighted material.
- It has been suggested that future hard disk drives include mechanisms that refuse to store copyrighted data.
- It has been suggested that VCRs and recordable DVD players be designed to make it impossible to fast-forward through the advertising in a TV program.

IP, Plagiarism and Universities

- In a university, students may engage in a number of activities that are fall under the heading of academic *misconduct*.
  - Collusion – two or more students working together on a piece of work intended to be carried out by a single student.
  - Copying – taking the work of another person and passing it off as your own.
  - Plagiarism – using someone else's work without acknowledging it.

Why do Students Cheat?

- because the task they have been set it too difficult for them
- because they are not capable of doing the task set
- because they are capable but not sufficiently organized
- because they are capable but want a better mark
- because their families want them to get a better mark
- because they are not prepared to devote the amount of time the task requires
- because they have devoted the time and feel they deserve the mark
- because the number of assessment tasks set is unreasonable
- because everyone else is cheating
- because cheating has become a habit
- because they do not agree that they are cheating
- because the tutor connives with the cheating
- because the resources required are not available

(From Fintan Culwin, LSBU)

What is Plagiarism ?

- From the Centre for the Study of Higher Education (Australia)
  - Cheating in an exam either by copying from other students or using unauthorized other aids.
  - Submitting, as one's own, an assignment that another person has completed.
  - Downloading information, text, computer code, artwork, graphics or other internet and presenting it as one's own without acknowledgment.
  - Quoting or paraphrasing material from a source without acknowledgment.
  - Preparing a correctly cited and referenced assignment from individual handing part or all of that work in twice for separate subjects/marks.

IP, Plagiarism and Universities

- The objection universities have to “the use of non-original material” does not normally stem from the usual reasons for protecting IP. The use of non-original material is counter to
  - a universities code of ethics – academics are expected to be honest and not present the work of others as your own.
  - the education process – if a student copies material or colludes with another, he or she is failing to carry out the learning/discovery processes upon which education is based.
  - the assessment process – if a student passes off the work of others as their own, he or she is attempting to defeat the goals of the examination/evaluation process.

Detecting Pre-used Material Electronically

- Students sometimes incorporate pre-used material in their reports and assignments.
- Much of this pre-used material comes from the Internet – often by cutting an pasting.
- Several programs exist to analyze a student's report for material taken from the Internet (or other students).
- Sometimes grammar style checkers can be used. These checkers record the statistics of the text as a running average (word length, writing style, active/passive, punctuation). The output of a checker can be used to detect abrupt changes of style that indicate a change of authorship.

Problems

1. What is intellectual property?
2. What are the essential differences between copyright protection and patent protection?
3. Which is worse, copyright infringement and plagiarism; and why?
4. If music is shared between people using the internet by swapping MP3 files, who loses? Who gains?
5. Can a dance be copyrighted?
6. Does copyright help or hinder censorship and control by a government?
7. What characteristics must an invention have in order for it to be patented?
8. How can patent law be used by companies as a tool of competition in a war with their competitors?
9. The greatest invention ever would be a perpetual motion machine. Why couldn't you patent it?
10. Why are computer programs such a difficult are of intellectual property to handle?
11. If you have a computer and sell it to a friend when you buy a new computer, are you breaking any rules/laws governing IP?
12. What is fair use in the concept of copying material from a book?
13. Is reverse engineering legal?
14. Are there circumstances in which copying software is ethical but illegal?
15. Why is the Digital Millennium Copyright Act so controversial?

1. Why (from a copyright point of view) is the ownership of books different from the ownership of software?
2. A key concept at the heart of patent protection is "prior art". What does this expression mean?
3. Attitudes to IP are often divided on political lines. What to conservatives, liberals, libertarians, and socialists view intellectual property differently?
4. Why is it so difficult to protect software? This question asks what features of software make it particularly difficult to apply IP protection to it.
5. What is the Napster case and how has it affected (if at all) the notion of IP protection and the use of the Internet?
6. If you have a desktop computer and a laptop computer, can you load the same software onto both computers and use each legally, provided you don't use both computers at the same time?
7. If you create an operating system that has the look and feel of Apple's operating system, you might be sued. Some might think that suing you is hypocritical? Why (look at Apple's early history).
8. Is reverse engineering legal? Is it moral? Is it justified?

References and Reading

- Computer Ethics, Tom Forester and Perry Morrison, MIT Press, 1990
- Ethics and Computing, Kevin W. Bowyer, IEEE Computer Society Press, 1996
- Cyberethics, Richard Spinello, Jones and Bartlett Publishers, 2000
- Ethics and Technology, Herman T. Tavani, John Wiley, 2004