COSC130 Fundamentals of Cybersecurity and Privacy

Tutorial Week 3 Solutions

1. The following is the 1997 version of the ACM Code of Ethics and Professional Conduct. Compare this version to the current (2018) version of the Code available from Code of Ethics (acm.org). Identify the principles that appear in both versions, as well as those that appear in only one version. Provide possible justification inclusion/exclusion of certain principles.

ACM Code of Ethics and Professional Conduct 1997

1. GENERAL MORAL IMPERATIVES.

1.1 Contribute to society and human well-being.
1.2 Avoid harm to others.
1.3 Be honest and trustworthy.
1.4 Be fair and take action not to discriminate.
1.5 Honor property rights including copyrights and patent.
1.6 Give proper credit for intellectual property.
1.7 Respect the privacy of others.
1.8 Honor confidentiality.

2. MORE SPECIFIC PROFESSIONAL RESPONSIBILITIES.

2.1 Strive to achieve the highest quality, effectiveness and dignity in both the process and products of professional work.
2.2 Acquire and maintain professional competence.
2.3 Know and respect existing laws pertaining to professional work.
2.4 Accept and provide appropriate professional review.
2.5 Give comprehensive and thorough evaluations of computer systems and their impacts, including analysis of possible risks.
2.6 Honor contracts, agreements, and assigned responsibilities.
2.7 Improve public understanding of computing and its consequences.
2.8 Access computing and communication resources only when authorized to do so.

3. ORGANIZATIONAL LEADERSHIP IMPERATIVES.

3.1 Articulate social responsibilities of members of an organizational unit and encourage full acceptance of those responsibilities.
3.2 Manage personnel and resources to design and build information systems that enhance the quality of working life.
3.3 Acknowledge and support proper and authorized uses of an organization's comput-

ing and communication resources.
3.4 Ensure that users and those who will be affected by a system have their needs clearly articulated during the assessment and design of requirements; later the system must be validated to meet requirements.
3.5 Articulate and support policies that protect the dignity of users and others affected by a computing system.
3.6 Create opportunities for members of the organization to learn the principles and limitations of computer systems.
4. COMPLIANCE WITH THE CODE.
4.1 Uphold and promote the principles of this Code.
4.2 Treat violations of this code as inconsistent with membership in the ACM.

Solution:

ACM Code of Ethics and Professional Conduct 1997	ACM Code of Ethics and Professional Conduct 2018	Comment
1.1 Contribute to society and human well-being.	1.1 Contribute to society and to human well-being, acknowledging that all people are stakeholders in computing.	extended to acknowledge the proliferation of computer technology in all areas of life
1.2 Avoid harm to others.	1.2 Avoid harm.	more general
1.3 Be honest and trustworthy.	1.3 Be honest and trustworthy.	the same
1.4 Be fair and take action not to discriminate.	1.4 Be fair and take action not to discriminate.	the same
1.5 Honor property rights including copyrights and patent.		excluded from the new version
1.6 Give proper credit for intellectual property.	1.5 Respect the work required to produce new ideas, inventions, creative works, and computing artifacts.	more general
1.7 Respect the privacy of others.	1.6 Respect privacy.	more general
1.8 Honor confidentiality.	1.7 Honor confidentiality.	the same

2.1 Strive to achieve the highest quality, effectiveness and dignity in both the process and products of professional work.	2.1 Strive to achieve high quality in both the processes and products of professional work.	'effectiveness' and 'dignity' removed
2.2 Acquire and maintain professional competence.	2.2 Maintain high standards of professional competence, conduct, and ethical practice.	extended to include 'conduct' and 'ethical practice' – it replaces principle 2.6. in the old version
2.3 Know and respect existing laws pertaining to professional work.	2.3 Know and respect existing rules pertaining to professional work.	More general to include all the rules and not only the laws
2.4 Accept and provide appropriate professional review.	2.4 Accept and provide appropriate professional review.	the same
2.5 Give comprehensive and thorough evaluations of computer systems and their impacts, including analysis of possible risks.	2.5 Give comprehensive and thorough evaluations of computer systems and their impacts, including analysis of possible risks.	the same
2.6 Honor contracts, agreements, and assigned responsibilities.		excluded from the new version, it is included in the extended principle 2.2
	2.6 Perform work only in areas of competence.	added to the new version in acknowledging the proliferation of computer technologies resulting in a large number of related field (thanks Hayley for this suggestion!)
2.7 Improve public understanding of computing and its consequences.	2.7 Foster public awareness and understanding of computing, related technologies, and their consequences.	extended to include 'awarness' acknowledging that it can prevent some computer crime (e.g., social engineering)
2.8 Access computing and communication resources only when authorized to do so	2.8 Access computing and communication resources only when authorized or when compelled by the public good.	extended to include 'public good' recognising that unauthorised action can be sometimes justified
	2.9 Design and implement systems that are robustly and usably secure.	added to the new version to acknowledge the emergence and importance of usable security.
	3.1 Ensure that the public good is the central concern during all professional computing work.	added to reflect the ubiquitous nature of computer technologies and their impact on the society at large

3.1 Articulate social responsibilities of members of an organizational unit and encourage full acceptance of those responsibilities.	3.2 Articulate, encourage acceptance of, and evaluate fulfillment of social responsibilities by members of the organization or group.	'encourage full acceptance' changed to 'encourage acceptance of and evaluate fulfillment' in recognition of continuous improvement nature of this principle
3.2 Manage personnel and resources to design and build information systems that enhance the quality of working life.	3.3 Manage personnel and resources to enhance the quality of working life.	almost the same
3.3 Acknowledge and support proper and authorized uses of an organization's computing and communication resources.		excluded from the new version as it is at incorporated in 2.8
3.4 Ensure that users and those who will be affected by a system have their needs clearly articulated during the assessment and design of requirements; later the system must be validated to meet requirements.		excluded from the new version as it is at last party incorporated in 3.1 and 3.7
3.5 Articulate and support policies that protect the dignity of users and others affected by a computing system.	3.4 Articulate, apply, and support policies and processes that reflect the principles of the Code.	reworded to refer to the Code
3.6 Create opportunities for members of the organization to learn the principles and limitations of computer systems.	3.5 Create opportunities for members of the organization or group to grow as professionals.	more general
	3.6 Use care when modifying or retiring systems.	added to emphasise importance of managing legacy systems
	3.7 Recognize and take special care of systems that become integrated into the infrastructure of society.	added to reflect the ubiquitous nature of computer technologies and the importance of their integration with other infrastructure

4.1 Uphold and promote the principles of this Code.	4.1 Uphold, promote, and respect the principles of the Code.	the same
4.2 Treat violations of this code as inconsistent with membership in the ACM.	4.2 Treat violations of the Code as inconsistent with membership in the ACM.	the same

2. In his book "Cryptography and Network Security", Stallings argues that ACM Code of Ethics and Professional Conduct and IEEE Code of Ethics share some common themes, including the following:
    a. dignity and worth of other people
    b. personal integrity and honesty
    c. responsibility for work
    d. confidentiality of information
    e. public safety, health, and welfare
    f. participation in professional societies to improve standards of the profession
    g. the notion that public knowledge and access to technology is equivalent to social power

    For each of the 10 principles of the IEEE Code of Ethics, specify the themes to which it contributes.

Solution:

	dignity and worth of other people	personal integrity and honesty	responsibility for work	confidentiality of information	public safety, health, and welfare	participation in professional societies to improve standards of the profession	the notion that public knowledge and access to technology is equivalent to social power
to hold paramount the safety, health, and welfare of the public, to strive to comply with ethical design and sustainable development practices, to protect the privacy of others, and to disclose promptly factors that might endanger the public or the environment;	X	X	X	X	X		
to improve the understanding by individuals and society of the capabilities and societal implications of conventional and emerging technologies, including intelligent systems;	X				X		X
to avoid real or perceived conflicts of interest whenever possible, and to disclose them to affected parties when they do exist;		X					
to avoid unlawful conduct in professional activities, and to reject bribery in all its forms;		X					
to seek, accept, and offer honest criticism of technical work, to acknowledge and correct errors, to be honest	X	X	X				

and realistic in stating claims or estimates based on available data, and to credit properly the contributions of others;							
to maintain and improve our technical competence and to undertake technological tasks for others only if qualified by training or experience, or after full disclosure of pertinent limitations;		X	X				
to treat all persons fairly and with respect, and to not engage in discrimination based on characteristics such as race, religion, gender, disability, age, national origin, sexual orientation, gender identity, or gender expression;	X	X					
to not engage in harassment of any kind, including sexual harassment or bullying behavior;	X	X					
to avoid injuring others, their property, reputation, or employment by false or malicious actions, rumors or any other verbal or physical abuses;	X	X					
to support colleagues and co-workers in following this code of ethics, to strive to ensure the code is upheld, and to not retaliate against individuals reporting a violation.		X				X	

3. In 1999, Gotterbarn argued that a software engineering code of conduct serves the following functions:

a. Inspiration
b. Guidance
c. Education
d. Support
e. Deterrence/discipline
f. Public image

For each of the 25 principles of the ACM Code of Ethics and Professional Conduct, specify the functions to which it contributes.

Solution:

The preamble to the Code states that "The Code is designed to inspire and guide the ethical conduct of all computing professionals, including current and aspiring practitioners, instructors, students, influencers, and anyone who uses computing technology in an impactful way." A closer inspection of the principles indicates that all the principles both inspire and guide computing professionals and can be used to support a professional who takes action. While most principles can also be understood to serve deterrence/discipline function, we only included 4.1 and 4.2 as they include other principles in this sense. The "Public image" function only seems to be directed supported by principle 2.3, which stipulates that "A rule may be unethical when it has an inadequate moral basis or causes recognizable harm. A computing professional should consider challenging the rule through existing channels before violating the rule. A computing professional who decides to violate a rule because it is unethical, or for any other reason, must consider potential consequences and accept responsibility for that action." However, in a more general context, one may consider most rules to serve the Public Image function.

	Inspiration	Guidance	Education	Support	Deterrence / discipline	Public Image

1.1 Contribute to society and to human well-being, acknowledging that all people are stakeholders in computing.	X	X	X	X		
1.2 Avoid harm.	X	X	X	X		
1.3 Be honest and trustworthy.	X	X	X	X		
1.4 Be fair and take action not to discriminate.	X	X	X	X		
1.5 Respect the work required to produce new ideas, inventions, creative works, and computing artifacts.	X	X	X	X		
1.6 Respect privacy.	X	X	X	X		
1.7 Honor confidentiality.	X	X	X	X		
2.1 Strive to achieve high quality in both the processes and products of professional work.	X	X	X	X		
2.2 Maintain high standards of professional competence, conduct, and ethical practice.	X	X	X	X		
2.3 Know and respect existing rules pertaining to professional work.	X	X	X	X		X
2.4 Accept and provide appropriate professional review.	X	X	X	X		
2.5 Give comprehensive and thorough evaluations of computer systems and their impacts, including analysis of possible risks.	X	X	X	X		
2.6 Perform work only in areas of competence.	X	X	X	X		
2.7 Foster public awareness and understanding of computing, related technologies, and their consequences.	X	X	X	X		
2.8 Access computing and communication resources only when authorized or when compelled by the public good.	X	X	X	X		
2.9 Design and implement systems that are robustly and usably secure.	X	X	X	X		
3.1 Ensure that the public good is the central concern during all professional computing work.	X	X	X	X		
3.2 Articulate, encourage acceptance of, and evaluate fulfillment of social responsibilities by members of the organization or group.	X	X	X	X		
3.3 Manage personnel and resources to enhance the quality of working life.	X	X	X	X		
3.4 Articulate, apply, and support policies and processes that reflect the principles of the Code.	X	X	X	X		
3.5 Create opportunities for members of the organization or group to grow as professionals.	X	X	X	X		
3.6 Use care when modifying or retiring systems.	X	X	X	X		
3.7 Recognize and take special care of systems that become integrated into the infrastructure of society.	X	X	X	X		
4.1 Uphold, promote, and respect the principles of the Code.	X	X	X	X	X	
4.2 Treat violations of the Code as inconsistent with membership in the ACM.	X	X	X	X	X	

4. You are an engineer designing software for self-driving cars. In the case of an imminent crash, where more than one action can be taken by the car, should the software choose an action that causes the least harm to the driver and passengers in the car, or the one that minimises the harm done to all the people involved in the crash? Justify your answer and make a reference to a professional code of conduct.

   Solution: This is a well-known ethical dilemma raised in the context of self-driving cars (note that such cars are still supposed to have a designated human driver who is able to take over the driving).

   While utilitarian ethics may suggest "minimising the harm to all people involved in a crash" as the right course of action, virtue and deontological ethics do not necessarily provide an obvious answer to this dilemma, especially as virtue ethics does not require a sacrifice of self.

   Contractualism and the MiniMax Complaint Principle ("When we would not be violating any moral constraints, we are morally required to act in the way that minimises the strongest individual complaint") may be particularly relevant for this dilemma – most people would agree that causing grave bodily harm to pedestrians cannot be justified by avoiding minor scratches to the car passengers and the other way around.

   The following are some arguments that could be used to justify the "least harm to car passengers" choice, especially if applied only when comparable complaints come from the car passengers and other participants:

   1) Most people would not buy a car that would protect others at their own expense (this could be seen as reflected in principle 2.3. of the Code.)
   2) In most cultures there is no expectation that people will sacrifice themselves to protect others (in such instances, actors are typically deemed to be 'heroes' rather than just doing what is expected from them.)
   3) The principle of double effect states that it is sometimes permissible to cause harm as a side-effect of an action doing some good, as long as the harm done is not a necessary condition to achieve good. In this case, the good is protecting the car passengers, and the harm done to other participants can be seen as a side-effect ('collateral damage').

5. You discover that your company does not encrypt any of the personal details about the customers, including their credit card details, and even sends them over the internet in plaintext form. What should you do in this case? Refer to a professional code of conduct to support your decision.

   Solution:

   A correct course of action could be approaching your supervisor and drawing their attention to a number of principles of the ACM Code of Ethics and Professional Conduct, including 1.2 Avoid harm, 1.6 Respect privacy, 1.7 Honour confidentiality, and 4.2 Treat violations of this code as inconsistent with membership in the ACM.