



Any examinee found adopting unfair means will be expelled from  
the trimester / program as per UIU disciplinary rules.

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*Answer all the 5 questions. Numbers to the right of the questions denote their marks.*

- Q1. Quinn is a member of a medical research team studying the role of genetic factors in psychological disorders, particularly focusing on how different variants influence social behaviour. To facilitate this work, Quinn built a tool that linked three anonymized data sets: an anonymized set of genetic test results of clinical diagnoses, and a custom database of public social networking posts. To preserve anonymity, the tool replaced all personally identifiable information in the social networking posts with quasi-identifiers (not directly identifiable, but can be identified with the help of other quasi-identifiers). Quinn's team was granted approval for a study by their ethics review board(ERB), on the grounds that all data was anonymous and/or public, and all users had opted in to the data collection.

While testing the tool, Quinn discovered a bug that incorrectly linked some records of multiple individuals as a single person. Given that the data sets were all anonymized, the team had accepted that such erroneous matches were likely to occur. The bug increased the expected number of such matches, but only slightly; as such, the bug was classified as low priority. Quinn raised concerns that there may be other such bugs and suggested that the source code be released under an open source license to facilitate peer review of both the tool and the overall research.

Analyse the above scenario using the ACM Code of Ethics, stating with reason which of the laws are being followed and which of them are being broken.

[5]

- Q2. Google's search autocomplete uses machine learning and other systems to suggest search results while typing. While it is designed to aid users, it has been under scrutiny for some years because of potential biases. For example, when you would search for the phrase "Sri Lankans are \_\_\_\_\_", Google autocomplete would output the following results:



Figure 1: Example Google Autocorrect

What kind of bias among the following three biases - cognitive, statistical, and historical - is being shown by the Google autocomplete algorithm in the example here? Why do you think autocomplete is showing that particular kind of bias? Can you think of a solution to how we can solve this bias?

[5]

- Q3. In 2017, Twitter conducted a research project involving the manipulation of content seen by over 600,000 users to investigate its impact on social media behavior. The study, titled "Analyzing Emotional Influence on Social Feeds," was a collaboration between Twitter, MIT, and the University of Amsterdam. During a week in March 2015, selected Twitter users experienced adjusted emotional content in their feeds. Positive and negative content ratios were altered for different users. The researchers then analyzed users' posts to measure the influence of the modified content on their own tweets. The findings revealed that users exposed to positive content were more likely to share uplifting posts, while those exposed to negative content exhibited a similar pattern. The study sparked ethical discussions due to Twitter's manipulation of social media behavior without explicit user consent. Later, Twitter published an article regarding how users can be manipulated.

What measure should Twitter have taken before such a research project?

[5]

Q4. Robert Downey Jr. (RDJ), known for his portrayal of Iron Man in the Marvel Cinematic Universe, forms his tech company, StarkTech Innovations. The firm pioneers a revolutionary brain-computer interface (BCI) device aimed at aiding people with disabilities and enhancing digital interactions. RDJ plans a comprehensive study involving diverse participants, but ethical dilemmas emerge. Informed consent becomes complex, especially for participants who might not fully understand the technology. The BCI's direct access to neural data raises privacy concerns, with potential breaches causing emotional harm. Long-term effects pose consent withdrawal challenges, and there's fear of widening societal inequalities due to technology access. The invasive nature of the study raises safety worries. To address these, StarkTech collaborates with neuroethics experts, employs clear communication, establishes robust consent protocols, prioritizes data security, and ensures participant well-being, striving to balance innovation with ethical considerations, just like RDJ's iconic Marvel character.

You have to point out the issues and describe the ethical challenges.

[5]

Q5. In July 2023, the European Union (EU) made a call to the smartphone industry, forcing them to make smartphones with replaceable batteries. EU claims that due to the batteries being non-removable in smartphones in recent days, consumers need to buy new phones whenever the batteries get damaged. With an average lifespan of batteries being 3 to 4 years, this can lead to premature disposal of otherwise functional devices, contributing to electronic waste and environmental concerns.

However, on the other hand, the industry players see this directive as an attempt to limit technological innovation. They argue that non-removable batteries have significant advantages, such as reduced manufacturing costs and lighter device weight. They also claim that by the time batteries wear out in a few years, the phones themselves often exhibit decreased performance due to aging components. In this context, purchasing new phones with better performance could actually be beneficial for consumers.

Provide your opinion from the Consumer Side on this matter. Support or refute the claims made above from both sides with proper analysis.

[5]