1. **Relationship between Requirements and Testing:**

Though testing and requirements seems to be two different methods or actions they are both linked to each other in one way or another. The requirement phase is for the developers to ask the clients or the customers for their expectations from the product to be developed. This comes after the analysis phase and before the development and the design of the product starts. Whereas the testing phase, it comes at the end when all the necessary development is done and when the product is ready for the deployment.

The link between the requirements and the testing phase starts here. During the testing phase the developer/ testing engineer tests the product against so many test cases which ensures that the product meets the requirements of the customer/client. Though they are several phases apart they are interlinked with each other. Without the requirements you might not have any criteria to check against. Without the testing phase you won’t be having any method to ensure that the product complies with all the requirements and regulations.

1. **Benefits of automating Software Engineering:**

**Requirement analysis:** Automating the requirement analysis makes it efficient since there is less chance to skip out standard procedures than while doing it manually.

**Design and coding:** Design and coding automation prone to less error since, the variability of human error is more compared to automation. Especially the designing phase consumes less time since the low spec and simple designs can be easily automated and saves much time for the user to focus on the complex structures.

**Testing:** Automated testing is kind of agrowing up domain where there are user generated test cases which can be used for multiple products of similar origin/functionality. These test cases are then fed to the automated testing tool which in turn reduces time consumption for the manual labor.

**Challenges of automating Software Engineering:**

**Requirement analysis:**  A client might feel good explaining his requirements to a human rather than a machine or a software. Also if the requirement is done manually then it could be more detailed than the automated one. Requirement engineer might interact with the client/customer more to gather more data which in turn makes the design and development easier than the automated ones.

**Design and coding:** Coding and designing at simple or low levelis easier to automate than the complex level programs and structural designs. The time it takes to automate the high end designing and coding is more compared to the actual time it takes for it to be done. And the possibility that it might end up in failure and waste of resources should also be noted.

**Testing:** Automated testing, though it seems simpler and less strenuous to implement it doesn’t mean that it works perfectly. Though product with similar origin/functionality can be tested with same kind of test cases sometimes a testing engineer might come up with a unique test case for a particular product. For ex: two different shopping websites can be tested with same kind of test cases but still they can differ in certain aspects such as payment method, delivery options, filtering etc.

1. **Ethical responsibilities of a software engineer with respect to AI (Artificial intelligence):**

AI has always been a sensational topic. It is faced with criticism and also admiration and excitement by the public. Though AI has its benefits and issues/concerns, it has to follow certain ethical responsibilities if it is being used anywhere.

1. Ensure human safety and it shouldn’t cause harm to any being with moral status.
2. Ensuring that control given for the AI is not beyond irreversible level or condition. Since if the AI takes full control of any sensitive or important machine/software/system or whatsoever it should be possible to regain the control in case of emergencies so it might not lead to any disaster for the living beings.
3. If an AI gains super intelligence or the intelligence level higher or equal to humans then it still shouldn’t cause harm to anyone.
4. If an AI happens to gain **sentience** or **sapience** then it shouldn’t be taken advantage of or misguided by people for their own self gain.

**Obtained from a published paper:**

**Sentience**: the capacity for phenomenal experience or qualia, such as the capacity to feel pain and suffer

**Sapience**: a set of capacities associated with higher intelligence, such as self- awareness and being a reason-responsive agent