**✅ Q1: How AI Code Tools (e.g., Copilot) Reduce Development Time + Limitations**

**Reduce Time by:**

* Autocompleting code and boilerplate.
* Suggesting context-aware snippets.
* Generating common patterns (tests, APIs).
* Assisting multi-language workflows.

**Limitations:**

* May produce buggy, insecure, or poor-quality code.
* Can’t handle high-level system design.
* Risk of over-reliance by developers.
* Potential IP and licensing issues.

**✅ Q2: Supervised vs Unsupervised Learning in Bug Detection**

| **Supervised** | **Unsupervised** |
| --- | --- |
| Needs labeled data (*bug/no bug*) | Uses unlabeled data |
| Classifies known bug patterns | Detects anomalies/clusters |
| High accuracy with good data | Works when labels are scarce |
| Data labeling is costly | May flag false positives |

**Summary**:  
Supervised is precise but data-heavy; unsupervised is flexible but less accurate.

**✅ Q3: Why Bias Mitigation Matters in AI Personalization**

* Ensures fairness and inclusivity.
* Maintains user trust and avoids stereotypes.
* Meets legal and ethical standards (GDPR, AI Act).
* Protects long-term business value.

**Example**:  
Biased recommendations could unfairly favor certain demographics or content, harming user experience and brand reputation.