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| **Test Case ID** | **Test Description** | **Input Data** | **Expected Output** | **Remarks** |
| TC01 | Add valid grades and calculate GPA | Student ID = "1", Name = "Alice"; Grades = [80, 90] | GPA ≈ 3.4 (within 0.01 tolerance) | Verifies GPA calculation with valid grades |
| TC02 | GPA with no grades | Student ID = "2", Name = "Bob"; Grades = [] | GPA = 0.0 | Ensures GPA defaults to 0 when no grades are present |
| TC03a | Invalid grade below range | Student ID = "3", Name = "Cara"; Grade = -5 | Throws IllegalArgumentException | Tests lower-bound validation for grades |
| TC03b | Invalid grade above range | Student ID = "3", Name = "Cara"; Grade = 105 | Throws IllegalArgumentException | Tests upper-bound validation for grades |
| TC04a | Invalid student constructor with empty ID | Student ID = "", Name = "Name" | Throws IllegalArgumentException | Verifies constructor validation for empty ID |
| TC04b | Invalid student constructor with empty Name | Student ID = "ID", Name = "" | Throws IllegalArgumentException | Verifies constructor validation for empty Name |