* **difference between for, while, and do-while loops**

| **Feature** | **for Loop** | **while Loop** | **do-while Loop** |
| --- | --- | --- | --- |
| **Initialization** | **Done in loop header** | **Done outside the loop** | **Done outside the loop** |
| **Condition Checking** | **Before executing the loop body** | **Before executing the loop body** | **After executing the loop body** |
| **Execution Guarantee** | **May not be executed if condition is false initially** | **May not execute if condition is false initially** | **Executes at least once, even if false** |
| **Best Use Case** | **When number of iterations is known** | **When the number of iterations is unknown** | **When loop must run at least once** |
| **Syntax Complexity** | **Compact, all parts in one line** | **More flexible, less compact** | **Like while, but with post-check** |
| **Typical Use** | **Iterating over arrays, counting loops** | **Input validation, reading data until a condition** | **Menu-driven programs, confirmation dialogs** |
| **Update Statement Location** | **In loop header** | **Inside loop body** | **Inside loop body** |