Assignment: Analysis of Scrolling

Task 1 – Scrollbar Interaction

Instructions:

1. Describe how scrollbar interaction works by breaking it down into Pointing (D, W), Touch, Move, and Release.
2. Define the variables:
   - D = distance to target
   - W = width of the target
   - T = movement time
3. Include the fixed cost of each Touch and Release (100 ms each).
4. Use the values below to compute total MT for scrolling:
   - Small document (10 pages):
     - Scroll 2 pages → 4 cm → 464 ms
     - Scroll 4 pages → 634 ms
     - Scroll 8 pages → 817 ms
   - Large document (100 pages):
     - Scroll 5 pages → 1 cm → 317 ms
     - Scroll 25 pages → 517 ms
     - Scroll 50 pages → 692 ms
   - Initial pointing (D1 to D2) → 692 ms
5. Calculate the total MT for each scroll scenario.

Problem Description:

The scrollbar interaction consists of:
- Pointing to the scrollbar from distance D1 to the elevator at D2, targeting width W2.
- Moving the elevator from D2 to D3, targeting width W3.
- Touching and releasing the screen, each adding 100 ms.

For each task, compute the total time:
- Add 692 ms for the initial pointing.
- Add the scrolling movement time based on the number of pages (see above).
- Include 100 ms for Touch + 100 ms for Release per operation.

Task 2 – Paging (Flicking) Gestures

Instructions:

1. Describe how paging with flicking gestures works.
2. Identify what time components are involved (e.g., time per flick, delays).
3. Estimate total MT for:
   - Small document (2, 4, 8 pages)
   - Large document (5, 25, 50 pages)
4. Compare the MT of paging with scrollbar interaction in both small and large documents.

Problem Description:

Paging involves quick finger flicks to move by one or more pages. While it avoids precision pointing, each flick still has its own interaction time.
For short scrolls, paging is often faster due to reduced overhead. For longer scrolls, cumulative time from multiple flicks can add up but may still be faster than slow or imprecise scrollbar use.

Efficiency depends on:
- Number of flicks required
- User skill level
- Document size and navigation distance

Task 3 – Direct Scrolling

Instructions:

1. Explain the principle of direct scrolling (speed of finger movement → speed of scrolling).
2. Use the provided data to estimate MT:
   - Small document:
     - 2 pages → 1s
     - 4 pages → 1s
     - 8 pages → 1s + 1s = 2s
   - Large document:
     - 5 pages → 1s
     - 25 pages → 9s
     - 50 pages → 20s
3. Discuss when this method is more efficient than others.

Problem Description:

In direct scrolling, the speed of your finger determines how fast the document scrolls. High-speed gestures can initiate continuous scrolling,
saving time especially for distant pages. This technique trades precision for speed and is more efficient for long scrolls.

Task 4 – Results Presentation

Instructions:

1. Create a table comparing Movement Times (MT) across all techniques:
   - Scrollbar
   - Paging
   - Direct Scrolling
2. Include Index of Difficulty (ID) values for each task if relevant.
3. Fill in estimated MT values for each case (2, 4, 8, 5, 25, 50 pages).
4. Create a graph showing MT vs. ID (or vs. page count) for all three techniques.

Task 5 – Comparison & Conclusion

Instructions:

1. Analyze your table and graph.
2. Compare technique performance across:
   - Small vs. large documents
   - Short vs. long scrolling tasks
3. Conclude which technique is most efficient under which conditions.
4. Consider factors like:
   - Movement time
   - Precision required
   - Ease of use

Final Submission Must Include:

- A clear step-by-step analysis of each scrolling method.
- A complete table of MT values.
- A graph comparing MT for all three techniques.
- A short discussion and conclusion.