Draw a Plain Weave: Over-Under Strand Construction

Original tasks 1, 2, 3 / complete keys

Task 1

A 3 by 3 grid shows F1 as U, O, U. Using the horizontal-over convention, state F2 and F3 and describe the drawing at each crossing.

Answer: F2 is O, U, O and F3 is U, O, U. Under horizontal-over, an O crossing has an unbroken weft line and a gapped warp line; a U crossing has an unbroken warp line and a gapped weft line.

Reason: Plain weave alternates within each row and shifts by one between rows. F1 starts with under, so F2 starts with over and F3 repeats F1.

Check: Write the table and confirm each row alternates and adjacent rows differ in every column.

Task 2

A 4 by 4 grid has F1 as O, U, O, U and F2 as U, O, U, O. F3 and F4 are blank. State both missing rows and explain the shift rule.

Answer: F3 is O, U, O, U and F4 is U, O, U, O. Each row shifts by one position from the row above, so F3 repeats F1 and F4 repeats F2.

Reason: The plain-weave sequence has period two in rows. With four columns, the shift by one produces the alternating pairs shown.

Check: Compare each column across adjacent rows; no column should have the same state in two adjacent rows.

Task 3

A student draws a 3 by 3 weave where every weft line is continuous and every warp line is broken at every crossing. Identify the structural error and state the corrected F1 and F2 sequences under the vertical-over convention.

Answer: The error is that no warp strand ever passes over, so the pattern is not a plain weave. Corrected: F1 is O, U, O and F2 is U, O, U under vertical-over, with warp lines continuous at O crossings.

Reason: A plain weave requires both over and under crossings in every row. Continuous weft at every crossing means every crossing is horizontal-over, which violates alternation.

Check: Count O and U states per row; each row must contain both, and adjacent rows must be offset.

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Original tasks 4 / complete keys

Task 4

Design a 4 by 4 plain weave using the vertical-over convention. State the full O/U table, the drawing order, and one valid alternative that the rubric would accept.

Answer: Table: F1 O,U,O,U; F2 U,O,U,O; F3 O,U,O,U; F4 U,O,U,O. Draw warp lines first, then weft rows top to bottom, breaking weft at U crossings. A valid alternative is the horizontal-over convention with the table inverted, provided it is stated and applied consistently.

Reason: The table follows the alternation and one-strand shift rules. Drawing order keeps crossings auditable. The alternative changes only the stated convention, not the structural logic.

Check: Audit all sixteen crossings against the table, confirm uniform gap size, and confirm the stated convention matches the drawn gaps.

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Source rubric / reflection

- [ ] The convention is stated in writing before drawing begins.
- [ ] Every row alternates over and under without exception.
- [ ] Each adjacent row is offset by exactly one strand position.
- [ ] Under-crossings use a consistent, visible gap; over-crossings are continuous.
- [ ] The strand count is at least three warp and three weft strands.
- [ ] The O/U table matches the drawn crossings at every intersection.
- [ ] Valid alternatives, such as horizontal-over convention or wider gaps, are accepted if applied consistently.

Reflection: What did you check, what did you change, and what will you try next?