1. The course DFA on input aba ends in state –

   ☐ q0

   ☐ q2

   ☐ q1

   ☐ no state

2. In the layered grammar, id + id * id has – parse tree(s)

   ☐ none

   ☐ two

   ☐ one

   ☐ three

3. The halting problem proof builds D(M) that –

   ☐ prints banana

   ☐ rejects everything

   ☐ loops exactly when H says M halts on M

   ☐ always halts

4. The lexer emits –

   ☐ (type, lexeme, position) triples

   ☐ assembly

   ☐ raw characters

   ☐ parse trees

5. The LL(1) table is filled from –

   ☐ FIRST and FOLLOW sets

   ☐ parse trees

   ☐ random choice

   ☐ the lexer

6. After constant propagation and folding, what value does ‘d‘ hold in ‘a = 5; b = a * 2; d = b - 3‘?

   _____

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   _____

8. The PDA for a^n b^n reads ‘aaaabb‘. How many symbols are on the stack?

   _____

9. The halting problem is recognisable.

   ☐ True ☐ False

10. How many tokens does ‘total = total + rate * 12;‘ produce?

    _____

1. **q1**

   q0-a-q1, q1-b-q2, q2-a-q1: ends q1, rejected (q2 accepts, not q1).

2. **one**

   Layering enforces precedence: x binds under T, deeper than +.

3. **loops exactly when H says M halts on M**

   D flips the answer about itself - running D on D contradicts.

4. **(type, lexeme, position) triples**

   Type for the parser, lexeme for messages, position for errors.

5. **FIRST and FOLLOW sets**

   FIRST chooses expansions; FOLLOW handles the empty production.

6. **7**

   b = 10, so d = 10 - 3 = 7.

7. **32**

   Each DFA state is a subset of the 5 NFA states: 2^5 = 32.

8. **2**

   Four pushes and two pops leave 2; the input is not accepted yet.

9. **True**

   Simulate M on w and accept if it halts; on a no-instance the simulation simply never ends.

10. **8**

    IDENT ASSIGN IDENT PLUS IDENT TIMES NUM SEMI: 8 tokens.

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