Solutions

2.1

- $7 \times 4 = 28$ bytes ✓.

2.2

- $0x50 = 80$ total $- 20$ header $= 60$ payload bytes ✓.

2.3

- Only the header – routers rewrite the header (TTL), never the data; the frame CRC already guards the whole frame link by link ✓.

3.1

- Version 4; IHL 6 $\Rightarrow$ 24 header bytes ✓.
- Total length $0x0078 = 120$; TTL $0x20 = 32$; protocol 17 = UDP ✓.
- Payload $= 120 - 24 = 96$ bytes ✓.
- Addresses: source `192.168.1.1`, destination `192.168.2.2` ✓.
- Arithmetic: total length = IHL bytes + payload, $24 + 96 = 120$ ✓.

3.2

- 4 frames (one per hop), 4 distinct destination MACs – each frame is addressed only to the next hop ✓.
- The next-hop MAC is chosen from the routing decision made on the destination IP ✓.
- TTL starts at H's sending value (e.g. 64); each router decrements by 1 ✓.
- At zero the router drops the packet and reports (time exceeded) – the TTL bounds a packet's lifetime in hops ✓.