Solutions

2.1

- $45 = 32 + 8 + 4 + 1 = 00101101_2$ ✓.

2.2

- $50 = 00110010_2$; flip 11001101; add $1 \to 11001110$ ✓.

2.3

- The code 49 – a code, not a value ✓.

3.1

- (i) 110, in range ✓.
- (ii) -110, in range $(-128..127)$ ✓.
- (iii) $155 > 127$: overflow; pattern reads $155 - 256 = -101$ ✓.
- Unsigned overflow is carry out of bit 7; signed overflow is when the carry INTO the sign bit differs from the carry out – same adder, two tests ✓.

3.2

- Largest: exponent 254 (biased) $\to 2^{127} \times \sim 1.111\ldots_2 \approx 3.4 \times 10^{38}$ ✓.
- $0.1 = 0.000110011\ldots$ repeating – no finite binary form, so it rounds ✓.
- Equality is unsafe because two differently-rounded paths reach slightly different values; compare $|a - b| < \varepsilon$ instead ✓.