

Solutions

Each answer shows the steps, then the **result**.

2.1

- **logic** error: it runs but the result (should be 5) is wrong

2.2

- **run-time** error: division by zero

2.3 any four, at least one from each kind:

- normal, e.g. 12: accepted; boundaries 8 and 20: accepted
- just outside, 7 and 21: rejected

2.4

- they show the values of variables **part-way through**, so you can see **where** a value first goes wrong

3.1 B

- the program runs but makes the wrong decision

3.2 C

- 2 resets the count to 0, so it returns 1 instead of 2

3.3 C

- 50 is the **boundary**: it should pass, but $50 > 50$ is false

3.4

(a)

- **average** is recalculated each pass; after the last pass it is $\frac{24}{3} = 8$
- **correct**: the final value is the average

(b)

- the loop body never runs, so **average** is **never assigned**
- `DISPLAY(average)` uses a variable with no value: a **run-time** error

(c)

```
IF(LENGTH(marks) = 0)
{
    DISPLAY("no marks")
}
ELSE
{
    total ← 0
    FOR EACH m IN marks
    {
        total ← total + m
    }
    DISPLAY(total / LENGTH(marks))
}
```

- test for an **empty** list first
- sum the marks in a loop
- divide **after** the loop and display