Solutions

2.1

- a and c: TP among the diseased – a/(a+c) ✓.

2.2

- LR+ = 0.90/0.20 = 4.5 ✓.

2.3

- Fewer diseased → fewer false negatives; the negatives are nearly all truly well ✓.

3.1

- Se = 160/200 = 80 %; Sp = 680/800 = 85 % ✓.
- LR+ = 0.80/(1−0.85) = 5.3 ✓.
- At 25 %: 250 diseased → 200 TP, 50 FN; 750 healthy → 112.5 FP, 637.5 TN ✓.
- PPV = 200/312.5 = 64 %; NPV = 637.5/687.5 = 92.7 % ✓.

3.2

- PPV falls: at 2 %, 20 diseased → 16 TP; 980 healthy → 147 FP → PPV = 16/163 ≈ 9.8 % ✓.
- NPV rises: false negatives shrink with the diseased minority → NPV ≈ 833/837 ≈ 99.5 % ✓.
- Programme consequence: most screen positives are false – a confirmatory (more specific) test is needed ✓.