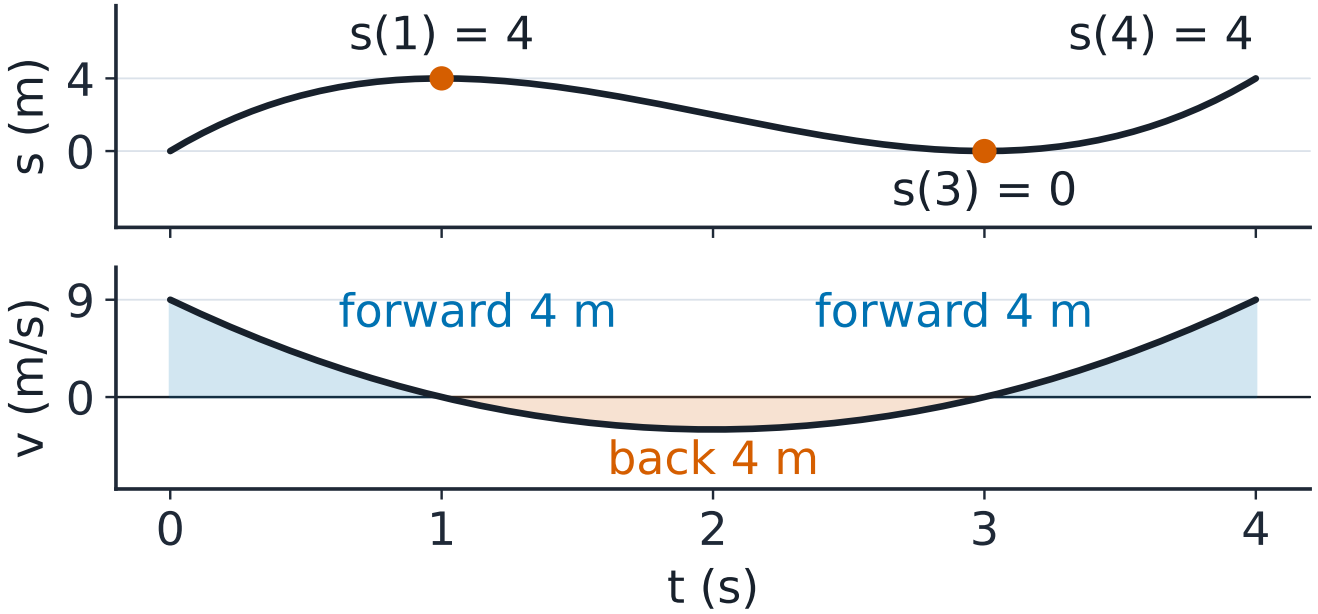
Exercise walk-through

2.6
Probability and uncertainty

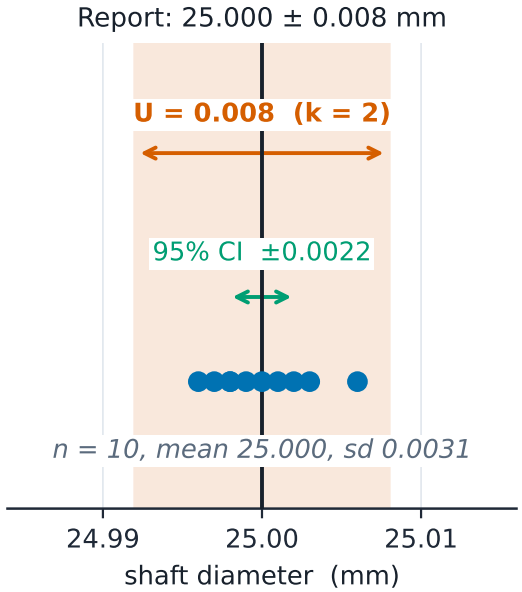
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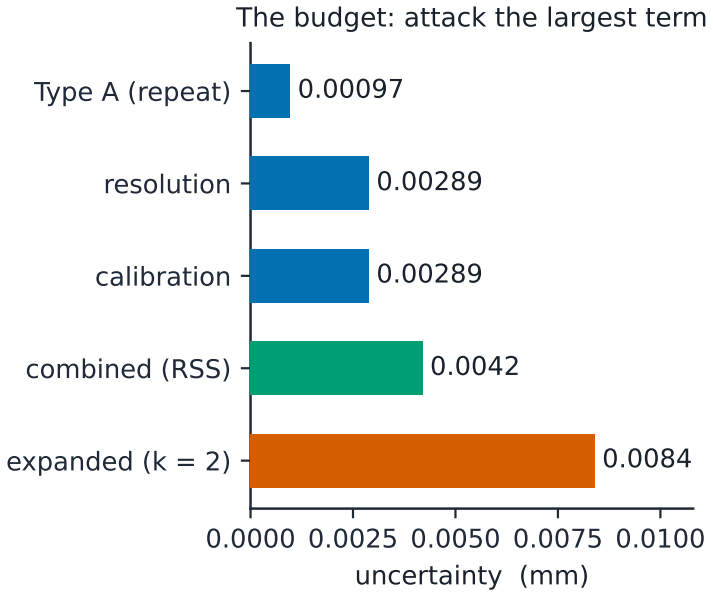
Calculus: the trace is a dictionary



Displacement 4 m but distance **12 m**: v changes sign at t = 1 and 3.

Probability: the interval travels with the number





Report **25.000 ± 0.008** mm (k = 2): resolution and calibration dominate.

Check yourself

- The two motion numbers and the fillet? (**Displacement** 4 m, distance 12 m; 53.62 m^3.)
- The joint, the modes and the rumour? ((2.857, 3.571) kN; 3 and 1 with (1, 1), (1, -1); $\kappa \approx 250{,}000$.)
- The rig's ODE numbers? (ω_d $= 4.899$; -0.527 at t $= 0.641$; peak 2.552 at r $= 0.959$.)
- The rates, the **flux** and the interval? ($\div 2$, $\div 4$, $\div 15.9$; $48 = 48$; 25.000 ± 0.008 mm $\rightarrow$ 490.9 ± 0.3 mm^2.)

Exercises 2.1·2.3

2.1 The mean, sd and standard error (four decimals). [3]

2.2 The two Type B terms (four decimals). [2]

2.3 u_c and U $(k = 2)$, and the report line. Which term dominates this time? [4]

Exercises 2.1·2.3

2.1 The mean, sd and standard error (four decimals). [3]

2.1

- Mean 18.5000 mm; sd 0.1309 mm.
- se $= 0.1309/\sqrt{8} = 0.0463$ mm.

2.2 The two Type B terms (four decimals). [2]

2.2

- Resolution $0.02/\sqrt{12} = 0.0058$; calibration $0.01/\sqrt{3} = 0.0058$ mm.

2.3 u_c and U $(k = 2)$, and the report line. Which term dominates this time? [4]

2.3

- $u_c = \sqrt{0.0463^2 + 0.0058^2 + 0.0058^2} = 0.047$ mm; $U = 0.094$ mm.
- Report 18.50 ± 0.09 mm $(k = 2)$ - here Type A dominates: more readings WOULD help (contrast the shaft case).

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Exercise 2.4

2.4 The link's cross-section $A = \pi d^2/4$ at the mean diameter: A (one decimal) and its propagated interval (one decimal). [5]

Exercise 2.4

2.4 The link's cross-section $A = \pi d^2/4$ at the mean diameter: A (one decimal) and its propagated interval (one decimal). [5]

2.4

- $A = \pi(18.5)^2/4 = 268.8$ mm2.
- $u_A = \frac{\pi d}{2} u_c = \frac{\pi \times 18.5}{2}(0.047) = 1.367$ mm2; report 268.8 ± 2.7 mm2 $(k = 2)$.