Solutions

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

2.1

- $H_0 : \mu_1 = \mu_2$

2.2

- $t = \dfrac{\bar{x}_1 - \bar{x}_2}{\sqrt{s_1^2/n_1 + s_2^2/n_2}}$

2.3

- $\sqrt{\dfrac{36}{36} + \dfrac{64}{64}} = \sqrt{1+1} = \sqrt{2} \approx 1.41$

3.1 B

- $\mu_1 = \mu_2$.

3.2 A

- $\sqrt{\dfrac{s_1^2}{n_1} + \dfrac{s_2^2}{n_2}}$.

3.3

(a)

- $\sqrt{\dfrac{100}{25} + \dfrac{100}{25}} = \sqrt{8} \approx 2.83$

(b)

- $t = \dfrac{70 - 65}{2.83} \approx 1.77$

3.4

(a)

- μ_A = true mean one-way commute time (minutes) of all Town A commuters; μ_B the same for Town B
- $H_0 : \mu_A - \mu_B = 0,\ \ H_a : \mu_A - \mu_B > 0$

(b)

- random: a simple random sample was taken from each town, and the samples are independent of each other
- 10%: $12 < 10\%$ of the over 20 000 commuters in each town, so observations within each sample are independent

(c)

- Town A: $n = 12 < 30$, but the dotplot shows no strong skew and no outliers, so the condition is met for A
- Town B: the time of 58 minutes is a clear outlier far above the rest, so the condition is **not** met for B; a t-test may be unreliable

3.5 B

- the before and after scores come from the same students, so the data are paired: use a one-sample t-test on the differences, not a two-sample test