Question 33 *(H8:6; B8.4.1)*

$$t = \frac{\overline{x}_A - \overline{x}_B}{s_p\sqrt{\frac{1}{n_A} + \frac{1}{n_B}}} = \frac{1.92 - 3.12}{\sqrt{2.09}\sqrt{\frac{1}{5} + \frac{1}{5}}} = -1.31$$

which is not significant against $t(8)$. There is no evidence that the drugs have different mean effects.

Or: one might immediately recognize that $1.31 < 1.96$, so the result does not achieve significance at the 5% level. [4]

Question 34 *(H8:6, 9:5, 9:7; B9.3.1, 9.3.2, 9.4.3)*

(a) A t-test is based on an assumption that the underlying populations are normal, and therefore symmetric. [1]

(b) We could use a transformation such as $\log x$ or $\sqrt{x}$ to haul in the long tails. [1]

(c) Use the Mann–Whitney–Wilcoxon test. [1]

Question 35 *(H9:6; B9.4.1, 9.4.2)*

(a) The sign test uses only *signs* of differences and ignores *sizes* and this leads to it being a less powerful test. [1]

(b)
$$z = \frac{w_+ - E(W_+)}{SD(W_+)} = \frac{302 - (n(n+1)/4)}{\sqrt{n(n+1)(2n+1)/24}} = \frac{302 - 715.5}{\sqrt{12\,759.75}} = -3.7.$$

We would be unlikely to obtain so high a value if the distributions were identical. [3]

Question 36 *(H10:7; B10.1.1, 10.4)*

(a) The slope gives the growth rate of ice crystals, measured in thousands of a millimetre per second. [2]

(b) From the diagram the straight line model is reasonable for x between 0 and about 200. But the model has been extrapolated too far from the domain for which it is constructed, and the characteristics of the ice crystals may be quite different from the predictions. [2]

Question 37 *(H10:5; B10.1.1, 10.4)*

The fitted straight line hits the x-axis at $\log(t) = 0.85/0.08$, so $t = \exp(0.85/0.08) =$ 41 151 minutes, or about 29 days—a month! [2]

Question 38 *(H11:1; B11.1.2)*

(a) $30/1820 = 0.016$; (b) $51/73 = 0.70$; (c) $8/30 = 0.27$. [3]

Question 39 *(H11:2; B11.2.1)*

This result says that the two variables involved are perfectly linearly related: given the value of one we can tell the value of the other; as one increases, the other decreases. [2]