

1. According to a Gunther and Morgado (2005, *Biological Research* 38:207-212) the time to reproductive maturity ($T =$ days) depends upon body mass as follows:

$$T = T(1 \text{ kg}) \cdot W^b$$

where $b = 0.29$

If $T(1 \text{ kg}) = 274$ days, calculate the time to maturity for a 50 kg organism.

$$T = \text{_____} [1]$$

Convert your calculation to years, then report it as a ratio relative to the normal time to reproductive maturity (in years) of a 50 kg human.

$$\text{Ratio} = (T_{\text{calculated}} / T_{\text{human}}) = \text{_____} [1]$$

Write the H_A/H_0 pair for testing whether the parameter b differs from simple isometric scaling, for which $b = 1$.

[2]

2. According to Fries et al (2000, *Journal of Gerontology* 55A:M336-M341) the prevalence of congestive heart failure in nursing home residents increases in a linear fashion with age up to age 98, then decreases with age beyond age 98. Define variables with symbols to test whether the increase up to age 98 is statistically significant.

[1]

Using your symbols, fill in the first two columns of an ANOVA table for the linear regression of congestive heart failure on age. Assume one observation per year, for ages 80 to and including 98.

[3]

The p-value in an ANOVA table, as computed from the F-distribution, assumes homogeneous errors. How would you evaluate the assumption?

[2]