Homework for 6.7

NOTE: Problem 28 was originally assigned, but needs Maple (not Matlab). Therefore, there are two "lines of best fit" problems for Matlab, and exercise 14.

14. (to get these finished a bit faster, I didn't make the vectors boldface)

    Verify the properties of the inner product, using the definition given:

    (a) $\langle u, v\rangle = T(u)\cdot T(v) = T(v)\cdot T(u) = \langle u, v\rangle$, where the second equality is true because the regular dot product is symmetric.

    (b) We'll wrap the next two items up:

    $$\langle cu+dw, v\rangle = T(cu+dw)\cdot T(v) = [cT(u) + dT(v)]\cdot T(v) = cT(u)\cdot T(v)+dT(w)\cdot T(v)$$

    (This property is all about linearity in the first position)

    (c) $\langle u, u\rangle = T(u)\cdot T(u) = \|T(u)\|^2$, so the dot product of a vector with itself is always non-negative. Furthermore, by the same equation, if $\langle u, u\rangle = 0$, then u must be the zero vector.

** Matlab line of best fit for the heart rate of Mammals.

SOLUTION: Find the line of best fit using the log of the given vectors, **w** and **r**- That is,

$$m\ln(w) + b = \ln(r)$$

And we should find that the slope for the line (the exponent of w^n) is about $-1/4$. The constant $b \approx 7.02$ so that A is about 1118.8:

$$r \approx 1118.8\, w^{-1/4}$$

** Matlab line of best fit: the slope is about 1.90 and the intercept is about 155.3.

Today the barometric pressure is 29.81, so the boiling point is 212° using our model.

The pressure due to elevation alone is about 28.7, which would give a boiling point of 210°