ASSIGNMENT ONE

(due Friday 3 October at Farquharson 229 before 5:00 PM)

Question One. *Radiative Balance*

(Per student vote.) Compare the radiative balance of a cold-blooded reptile and a warm-blooded mammal (select examples that are similar in size).

Determine their surface area, specific and total metabolic rate <u>at rest</u>, and the impact of radiative heat loss on their body temperature. Make sure you cite any references you use in a way that will make it possible for your professor to find the reference easily. Please ensure you show units!

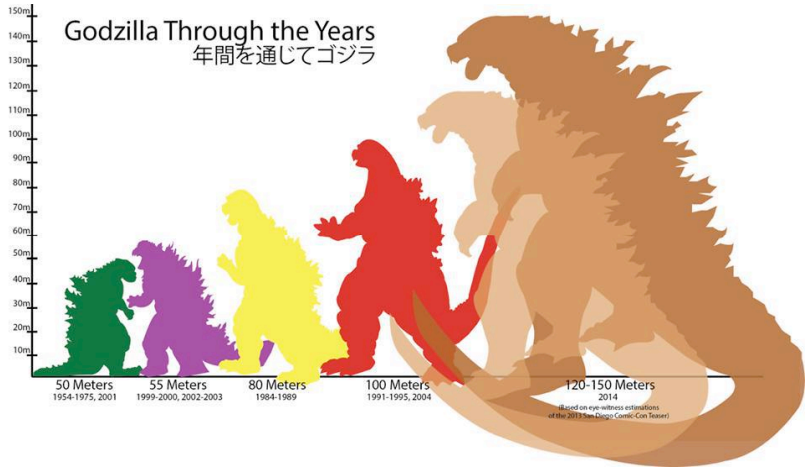
Hints and facts that you may (or may not) find useful...

• Take a look at your course notes related to radiative heat emission. For $T_{ambient}$, the T_{sky} is usually used, about –20 Celsius).

• You will need to search the literature for caloric requirements of the examples you choose, and may have to make an informed estimate of their size and surface area.

Question Two. *Galileo scaling and the strength of biomaterials*

Over fifty years, Godzilla has rapidly increased in size at an astonishing rate. Would it work? Explain clearly with suitable quantitative analysis. Assume the tail is not load-bearing.



Guidelines

I expect that students may wish to work together on the assignment, that is fine, but be sure that your assignment is in your own words. Remember that you have to explain your answers with sufficient clarity, so that a non-physicist like Dr. Lew will understand them. He often finds diagrams helpful and is obsessed with ensuring that the units work, so showing the units is obligatory. Excessive length is not encouraged.