ASTRONOMY 310
General math review

This is a review of some general math concepts for ASTR 310 which we take to be prior knowledge. This review is not for credit; check your reponses versus the answers for these questions that are posted on the course web page at

http://www.phas.ubc.ca/ gladman/a310

The questions below are as difficult as the math will get in this course. While some of you may be a little rusty, you can get help on these issues if you wish, by attending a mathematics help session/question period in the Zoom room (see Canvas for the link and the hours). If you wish help but cannot get to that day's help session, contact the instructor for an appointment.

1. Using data from Appendix A in the text book, express the radius of the Sun in:

a) km, in scientific notation

b) m, in both scientific nontation and written out

c) Astronomical Units (AU)

d) as a ratio of the radius of the Earth

Appendices C.2, C.3 and C.5 in the book offer a review on scientific notation, units, and ratios that may be helpful.

2. (a) Neptune orbits the Sun at 30.1 times the distance the Earth orbits the Sun. The Earth's orbital distance (called the *astronomical unit*, abbreviated AU) is 1.496×10^8 km. Using correct scientific notation (see Appendix C.2) express Neptune's orbital distance in km.

b) The nearest stars are about a parsec (abbreviated pc) away. A parsec is $\simeq 3.09 \times 10^{13}$ km away. Express Neptune's orbital distance from the Sun in units of pc.

3. The mass of the Earth is $M = 6.0 \times 10^{24}$ kg and its equatorial radius is r=6378 km. Assuming it is a sphere, express its average density ρ =Mass/Volume in units of

a) kg/m^3

b) g/cm^3

4. The moon takes about 27.3 days to complete an orbit of the Earth. If one takes the Moon's orbit to be a circle of radius 380,000 km, how fast is the Moon moving, expressed in

a) km/h

b) km/s

5. With 2 digits after the decimal place, use your calculator to determine

(a) $\sqrt{5}$ (also written $5^{1/2}$) "the square root of five, or five to the power of one-half"

(b) $2^{3/2}$ (also written $2^{1.5}$) "two to the power of three-halves, or two to the power 1.5"

(c) $20^{1/3}$ "twenty to the power of one third, or the cube root of twenty"

(d) $8^{2/3}$ "eight to the power of two-thirds"