

## DM2212 Week 3 exercises

1. Each of the following conversions contains an error. In each case, explain what the error is.

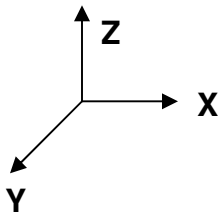
(a)  $1000 \text{ kg} \times \frac{1 \text{ kg}}{1000 \text{ g}} = 1 \text{ g}$

(b)  $50 \text{ m} \times \frac{1 \text{ cm}}{100 \text{ m}} = 0.5 \text{ cm}$

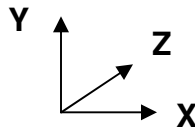
(c) "Nano" is  $10^{-9}$ , so there are  $10^{-9}$  nm in a meter.

(d) "Micro" is  $10^{-6}$ , so 1 kg is  $10^6$   $\mu\text{g}$ .

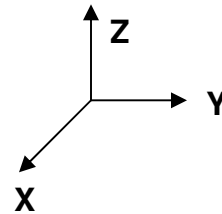
2. For each figure, state whether it is a right or left handed coordinate system:



(a)



(b)



(c)

3. Based on the definitions of the sine, cosine, and tangent, what units must they have?
4. Your backyard has brick walls on both ends. You measure a distance of 23.4 m from the inside of one wall to the inside of the other. Each wall is 29.4 cm thick. How far is it from the outside of one wall to the outside of the other?
5. In the last century, the average age of the onset of puberty for girls has decreased by several years. Urban folklore has it that this is because of hormones fed to beef cattle, but it is more likely to be because modern girls have more body fat on the average and possibly because of estrogen-mimicking chemicals in the environment from the breakdown of pesticides. A hamburger from a hormone implanted steer has about 0.2 ng of estrogen (about double the amount of natural beef). A serving of peas contains about 300 ng of estrogen. An adult woman produces about 0.5 mg of estrogen per day (note the different unit!). (a) How many hamburgers would a girl have to eat in one day to consume as much estrogen as an adult woman's daily production? (b) How many servings of peas?

Ref: Benjamin Crowell, 2007. [Newtonian Physics](#), rev 4th.