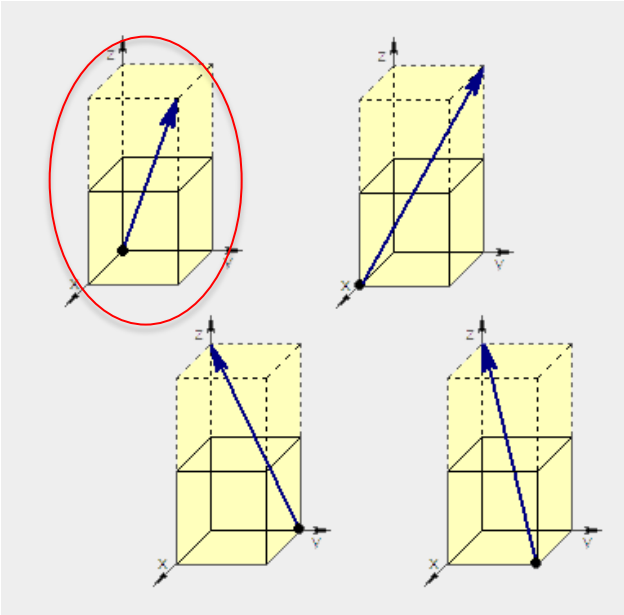
ChE-403 Problem Set 2.1

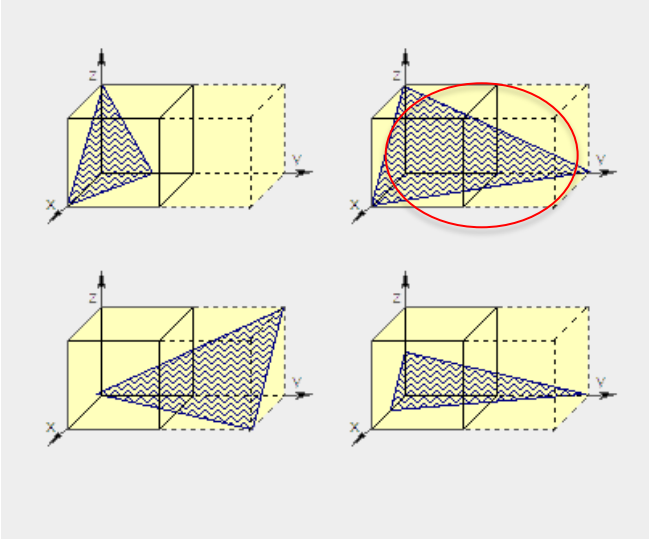
Week 5

Problem 1

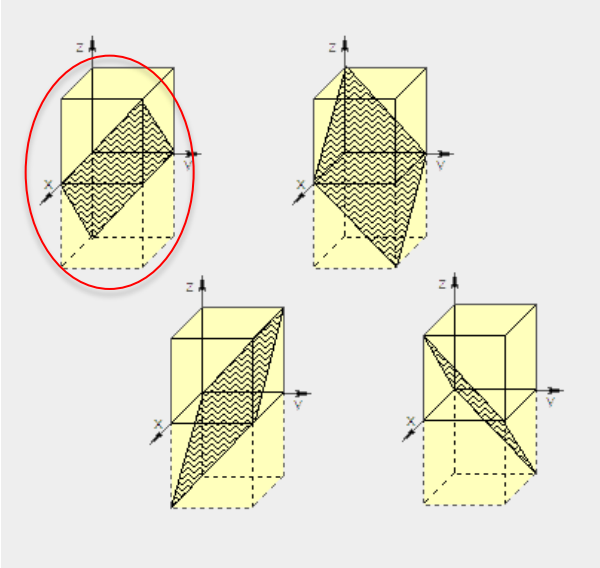
Which is the [1,1,2] direction?



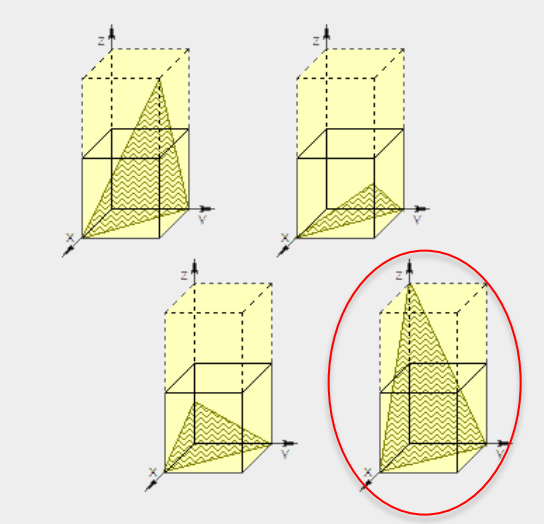
Which is the (2,1,2) plane?



Which is the (1,1,-1) (usually written as $(1,1,\bar{1})$) plane?



Which is the (2,2,1) plane?

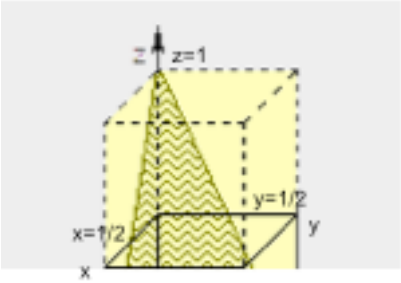


Problem 2

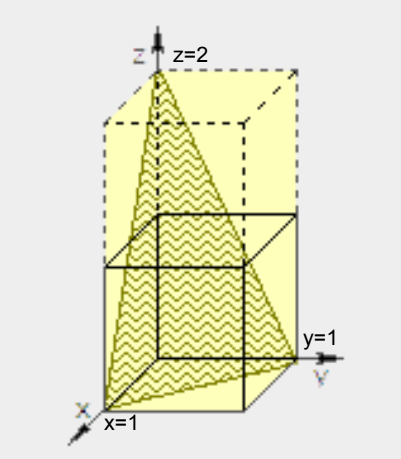
2.1 Can you draw a (1,2,1) plane both in a single (1,1,1) box and as a larger plane that only has unity coordinates (see example below)?

Example: for a plane (2,2,1) we have:

Single (1,1,1) box:



Larger plane with unity coordinates:

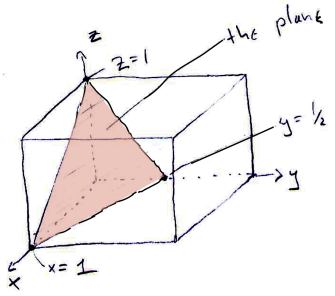


2.2 What would the larger plane (what is shown above to the right) with only unity coordinates be for a (2,1,3) vector? (Don't draw it, just give the coordinates)

Solution:

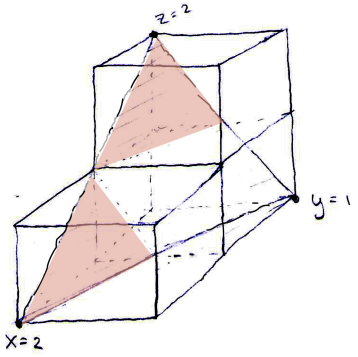
2.1.

2.1



for a (1,2,1) index we will cut the box in: (1, ½, 1)

If we have a surface that cuts the x,y,z planes in 1, ½, 1 than it will also form a surface that will connect at coordinates (2,1,2):



Note that in the second drawing we show the same unit box planes from the first drawing in the larger surface.

2.2. In the unit box, this would form a surface that would cut the x,y,z planes at (1/2, 1 , 1/3). To make this whole we have to multiply by 3x2=6. The surface would connect the following coordinates: (3, 6, 2)

Problem 3

Determine the Miller Indices of a plane which is parallel to the x-axis and cuts the y axis at 2 and the z-axis at 1/2?

Solution:

3.1. The intercepts are:

$x=\infty$ $y=2$ $z=1/2$

The inverse of that is:

$1/x=0$ $y=1/2$ $z=2$

Miller indexes cannot have fractions, so we write:

(0,1,4)