1.3x-Julia

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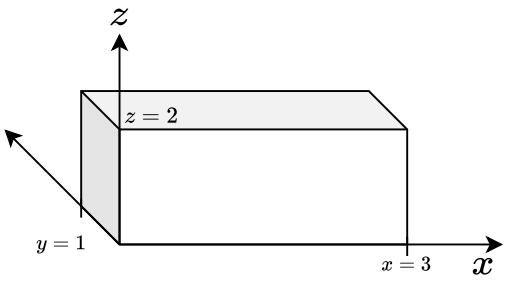
1 Angle between body diagonals of a rectangular solid

Estimated time to complete: 1 hour This notebook uses Julia; change the kernel to python if you prefer. Vectors are easier to deal with in Julia (they are part of the base functionality); in python, you will have to import and use numpy to deal with vectors.

You are handed a rectangular solid with sides of length 1, 2, and 3 cm as pictured below:



Find the angles in degrees beween the body diagonals of the rectangular solid by following the following steps.

1.1 Step 0:

Put all needed import statements in the cell below:

[ ]:

1.2 Step 1

Define four vectors, $v1, v2, v3, v4$, one for each of the four body diagonals. Then print out each of the four body diagonal vectors. Define your vectors such that the x-component of each is +3.

[ ]:

1.3 Step 2

Now write a function called *angles* which takes as input, two vectors, and returns the smallest angle between the vectors. Return this as an angle in degrees rounded to **three** decimal places.

[ ]:

Test this function by using $a = [3, 1, 2]$ and $b = [3, 1, -2]$, and print out the result (you should find that it is equal 64.623^o).

[ ]:

1.4 Step 3

Now define an array x which is an array whose elements are the vectors $v1, v2, v3, v4$. Then write a function called *find_angles* which takes as input x and computes all the possible angles and returns only the unique values (i.e. it doesn't return duplicate values).

[ ]:

Call this function to see the list of unique body diagonal angles.