M110C Quiz#2, Spring 2022.

The directions for this quiz are the same as for quiz#1. In short, you should do as much of this quiz as you can before we meet as a class. In that meeting you'll be placed in groups where you compare answers, possibly give some help to (or get help from) your fellow classmates. When you're as ready as possible as a group, you'll summon me and explain your solutions.

In addition to those directions, note that you may use online technology to check your work, but you should be able to explain how to do each problem without relying on any technology.

Rubric:
Show-up to the quiz meeting: 4pts.
Questions 1,2,3: 2 pts each.
Total possible: 10 pts

1.

a) Find the equation of the line that goes through $P(3,-2,-1)$ and $Q(2,2,1)$.

b) Find the equation of the plane that contains the points $A(1,0,1)$, $B(1,1,1)$, and $C(-1,1,0)$.

c) Find the equation of the line where the planes $x - z = 1$ and $y + z = 2$ intersect.

2. Compute the following quantities:

a) the acute angle between the planes $x + y - z = 0$ and $-x + 2z = 3$

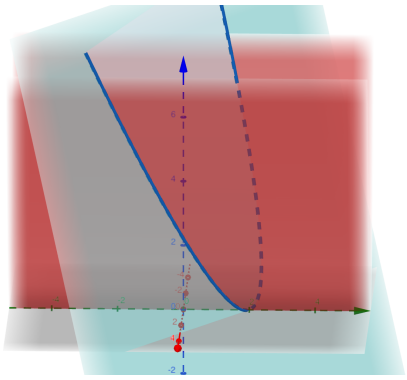
b) the distance between the parallel planes $3x - 4y + z = 2$, and $6x - 8y + 2z = 6$

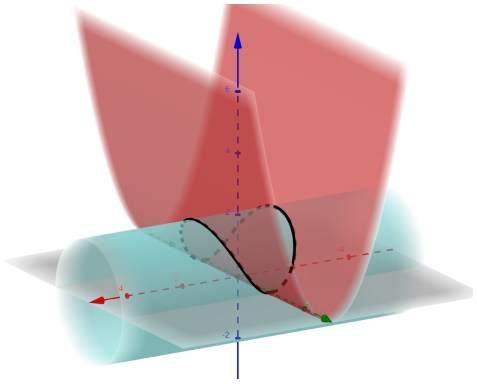
c) the distance between the lines

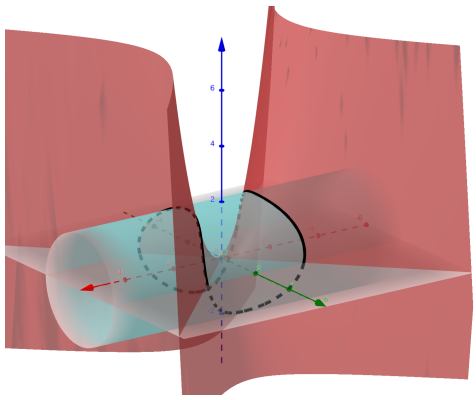
$\mathbf{L}(t) = < 4 + t, -3, 2 - 3t >$ and $\mathbf{K}(s) = < 1 - 2s, 5 + s, s >$.

3. Parameterize the curve where the given surfaces intersect.

a) $z = x^2, \quad 2x + 3y + z = 6$ b) $z = x^2, \quad y^2 + z^2 = 4$ c) $y^2 + z^2 = 4, \quad z = x^2 - y^2$







4. (these problems are optional extra credit. You won't be asked to explain them unless you want to. You may try many if you want, but the highest score you can get on the quiz is 11/10).

A 'locus' of points is a collection of points that satisfy a certain condition. For example, the locus of points on a plane that are a distance of 1 from the origin is given by $x^2 + y^2 = 1$, and the locus of points in space that are 1 unit from the origin is given by $x^2 + y^2 + z^2 = 1$.

a) (0.5 pts) Find the the locus of points in space that are equidistant to $P(1,0,0)$ and $Q(0,1,1)$.

b) (1 pt) Find the locus of points in space that are equidistant to the two lines in question 2c).

c) (1 pt) You have a 45-45-90 triangle, and a point inside. The distance from this point to the corner of the triangle is $D_1 = \sqrt{50.5}$. The distances from the point to the other two vertices of the triangle are $D_2 = \sqrt{174.25}$ and $D_3 = \sqrt{141.25}$. What is the area of the triangle?