

Math 213 Calculus III

Spring 2013

Wednesday, May 1

Section 9.1

Topics:

1. Points in 3-D space
2. Equations of planes
3. Equation of sphere
4. Mathematica

Homework for Thursday

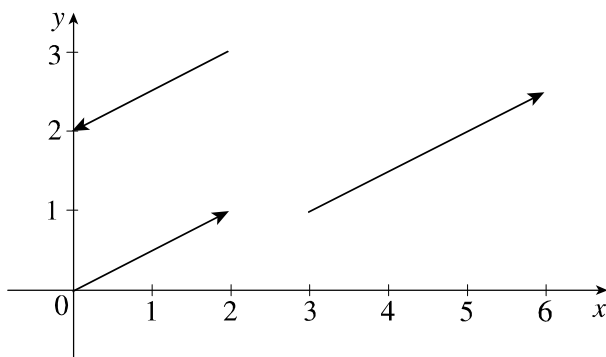
Homework Problems:

- Complete all Class 01 Worksheets
- WebAssign Assignment 1 HW
- Mathematica Class 01 Assignment
- Reading Questions on Sections 9.1–9.4

Reading the Text

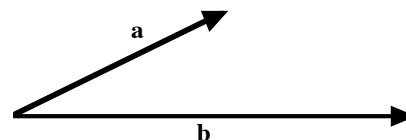
Read Sections 9.1-9.4 and answer the following questions

1. Explain why the equation $y=x$ is the equation of a plane, not a line, in 3-D space.
2. What is the distance between the points $(-1,-1,-1)$ and $(-4,-1,3)$?
3. Are the following three vectors parallel?



4. If $\mathbf{a} = \langle a_1, a_2, a_3 \rangle$ has $a_2 > 0$ and $a_3 < 0$ then is the z component of $-3\mathbf{a}$ positive or negative?
5. Consider the two vectors on the right.

Draw the vector projection of \mathbf{b} onto \mathbf{a} and the vector projection of \mathbf{a} onto \mathbf{b} .



6. What is the angle between the vectors $\langle 1, 0, -1 \rangle$ and $\langle 1, 1, 0 \rangle$?
7. Why is it that if $\mathbf{a} \cdot (\mathbf{b} \times \mathbf{c}) = 0$ then \mathbf{a} , \mathbf{b} , and \mathbf{c} are coplanar?

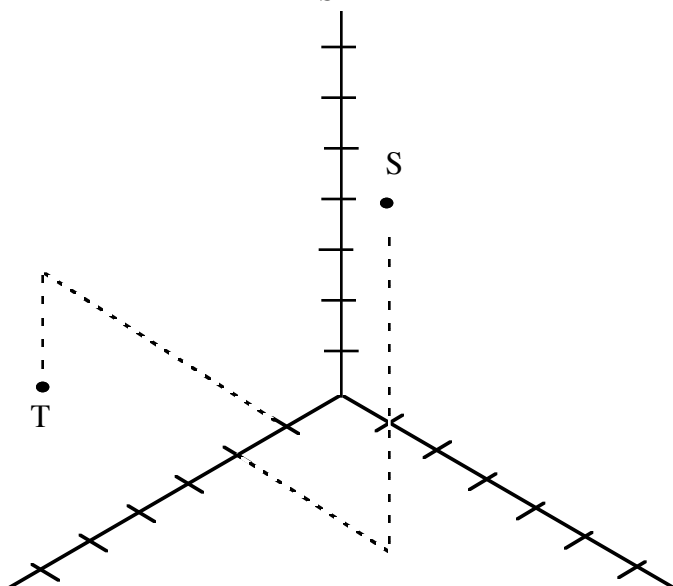
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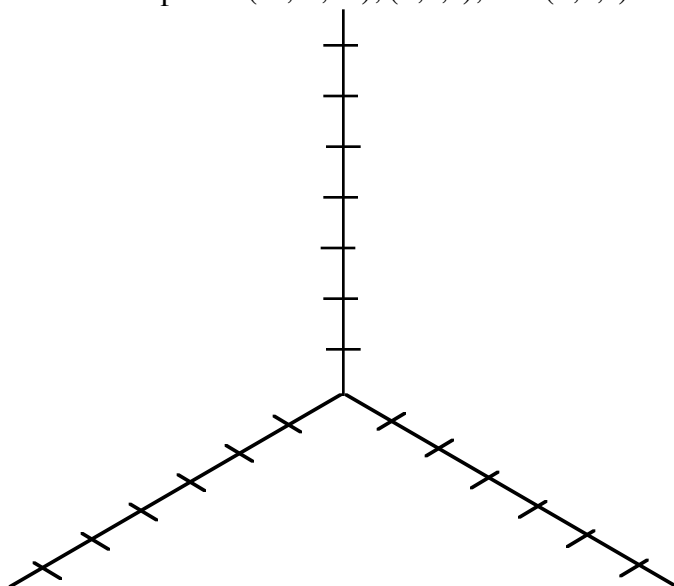
8. What is the volume of the parallelepiped defined by the vectors $\langle 1, 1, 1 \rangle$, $\langle 0, 1, 1 \rangle$ and $\langle 1, 2, 0 \rangle$?

Math 213 Class 1: Points in the XYZ coordinate system

1. Find the coordinates for S and T shown below:



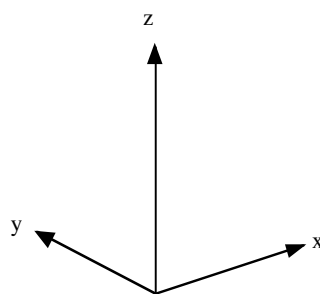
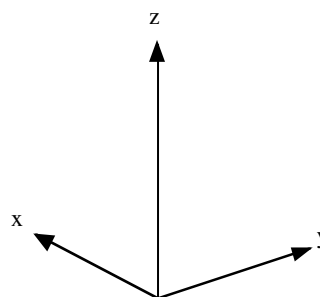
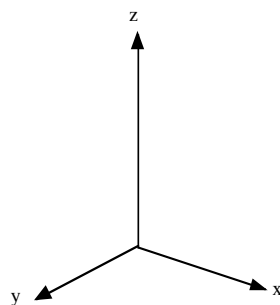
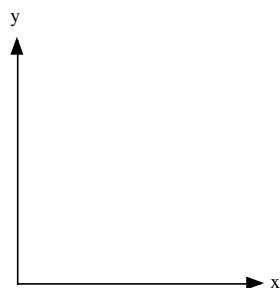
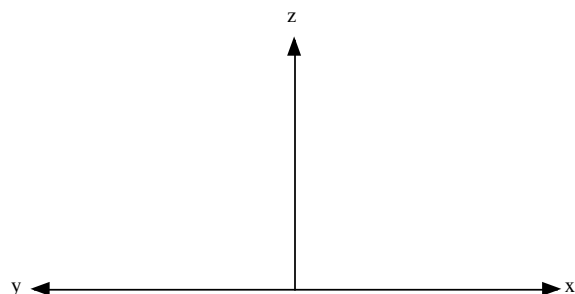
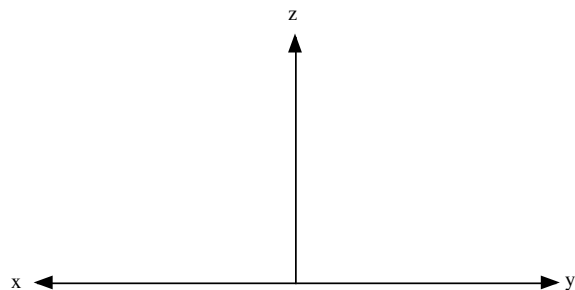
2. Plot the points $(-2, -5, -8)$, $(3, 0, 1)$, and $(2, 3, 5)$ in the xyz coordinate system provided.



3. Symbolically describe the line that passes through points S and T .
4. Symbolically describe the plane that passes through the points $(1, 0, 0)$, $(0, 2, 0)$ and $(0, 0, 3)$.

Math 213 Class 1: Visualizing the XYZ coordinate system

For each of the following views of the xyz coordinate system, describe the physical point of view. That is: find the direction from which to look in order to match the view that you see. One way to do this is to write the signs of each of the coordinates of the point of view, for example (pos, neg, pos) next to each of the diagrams. Note that the arrows point in the positive direction.

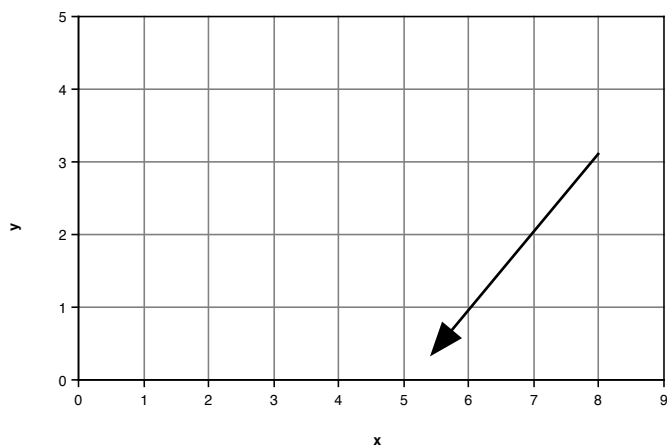


Draw the picture of the xyz coordinate system as it would appear from a view point whose coordinates are (neg, neg, pos).

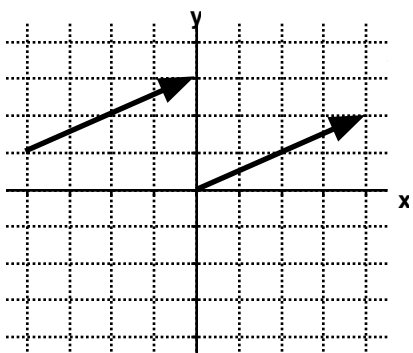
Draw the picture of the xyz coordinate system as it would appear from a view point whose coordinates are (neg, pos, pos).

Math 213 Class 1: Vectors in the Plane

1. Into the xy system shown, draw the vector with components $\langle 4, 1 \rangle$ and initial point at the origin.
2. Into the xy system shown, draw the vector with components $\langle 4, 1 \rangle$ and initial point at $(3, 2)$.
3. Find the components of the vector shown.



4. Are the following two vectors the same vector or different vectors?



5. Are the following three vectors parallel?

