TEXAS A&M UNIVERSITY
Math Learning Center

Math 251 – Fall 2021
Week In Review

Wir 1: 12.1 to 12.3

Section 12.1

Problem 1. Find the center and radius of the sphere $x^2+y^2+z^2+4x-2y-8z=5$. Does this sphere intersect the xz plane? If so, what is the intersection?

Problem 2. Find equation of the sphere with center $(1,2,5)$ that touches the xy plane.

Problem 3. Find the equation of the sphere if one of their diameters has endpoints $(5,1,5)$ and $(7,3,9)$.

Problem 4. What does $y=6-x$ represent in $\mathbb{R}^3$?

Problem 5. What does $x^2+z^2=16$ represent in $\mathbb{R}^3$?

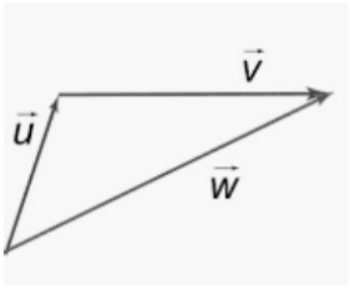
Problem 6. Write a set of inequalities that describes the solid upper hemisphere $x^2+y^2+z^2=9$.

Section 12.2

Problem 7. Give a graphical interpretation of vector sum and vector difference.

Problem 8. Given $\mathbf{a}=\langle -7,1,2\rangle$ and $\mathbf{b}=\langle 5,-1,1\rangle$, find a unit vector in the direction of $\mathbf{a}+2\mathbf{b}$.

Problem 9. For the picture seen below, write $\mathbf{v}$ in terms of $\mathbf{u}$ and $\mathbf{w}$.



Thanks to Amy Austin for generously sharing her WIR problems from last semester.

Section 12.3

Problem 10. Compute $\mathbf{a} \cdot \mathbf{b}$ if

a.) $\mathbf{a} = \langle 4, 5, -1 \rangle$ and $\mathbf{b} = \langle 2, 1, 3 \rangle$.

b.) $|\mathbf{a}| = 2$, $|\mathbf{b}| = 5$ and $\theta = 120°$.

c.) $|\mathbf{a}| = 6$, $|\mathbf{b}| = 4$ and $\mathbf{a}$ is perpendicular to $\mathbf{b}$.

d.) $|\mathbf{a}| = 6$, $|\mathbf{b}| = 4$ and $\mathbf{a}$ is parallel to $\mathbf{b}$.

Problem 11. Are the vectors $-8\mathbf{i}+4\mathbf{j}+12\mathbf{k}$ and $6\mathbf{i}-3\mathbf{j}-9\mathbf{k}$ parallel, perpendicular, or neither?

Problem 12. The points $A(0, -1, 6)$, $B(2, 1, -3)$ and $C(5, 4, 2)$ form a triangle. Find $\angle C$.

Problem 13. Find the vector and scalar projection of $\langle 1, 2, 5 \rangle$ onto $\langle 0, 7, 4 \rangle$.

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