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Homework Self-Reflection

Semester: Fall 2019	*Subject*: CIVE 260 Statics	*Assignment*: HW04

Individual Problem Reflection

Problem Name/#: **2-99**

Topics covered:

What parts of this problem did you find challenging?

Problem Name/#: **2-70**

Topics covered: VECTOR COMPONENTS & VECTOR ADDITION

What did you learn by working on this problem? USING RATIOS OF A TRIANGLE TO BREAK VECTOR INTO ITS COMPONENTS

What are your plans for improving your understanding of this type of problem? WORK ON MORE 3D VECTOR ADDITION PROBLEMS

Problem Name/#: **HW04_#3**

Topics covered: DOT PRODUCTS, PROJECTIONS, & VECTOR MATH

What advice would you give to someone else who was about to start this problem? THE PART OF $\vec{A} \perp \vec{B}$ PLUS THE PART OF $\vec{A} \parallel \vec{B}$ IS EQUAL TO THE TOTALITY OF $\vec{A}$.

How would you grade your effort to learn on this assignment? (fill box) ☐0 ☐1 ☐2 ☐3 ☒4pts

How would you grade your effort on this self-reflection? ☐0 ☐1 ☐2 ☐3 ☒4pts

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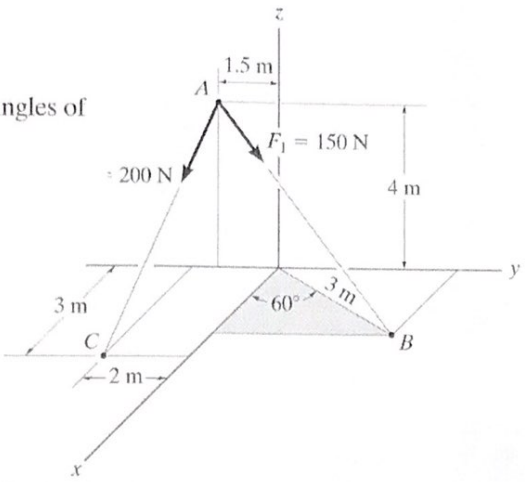
2–99.

Determine the magnitude and coordinate direction angles of the resultant force acting at point A.



F_A

$\frac{200\text{ N}}{F_{AX}} = \frac{5}{3}$ $\quad F_{AX} = 120\text{ N}$

$\frac{200\text{ N}}{F_{AY}} = \frac{5}{}$ $\quad F_{AY} = 0$

$\frac{200\text{ N}}{F_{AZ}} = \frac{5}{4}$ $\quad F_{AZ} = 160\text{ N}$

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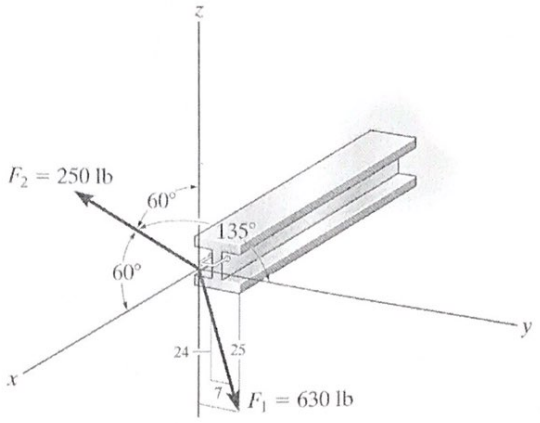
2–70.
The beam is subjected to the two forces shown. Express each force in Cartesian vector form and determine the resultant vector (expressed as components).



$F_{2x} = 250\,lb \cos(60) = 125\,lb\ \hat{i}$

$F_{2y} = 250\,lb \cos(135) = -176.78\,lb\ \hat{j}$

$F_{2z} = 250\,lb \cos(60) = 125\,lb\ \hat{k}$

$\frac{630\,lb}{F_{1y}} = \frac{25}{7}$ $\quad F_{1y} = 176.4\,lb\ \hat{j}$

$\frac{630\,lb}{F_{1z}} = \frac{25}{24}$ $\quad F_{1z} = -604.8\,lb\ \hat{k}$

$F_1 = 0\,\hat{i} + 176.4\,lb\,\hat{j} - 604.8\,lb\,\hat{k}$

$F_2 = 125\,lb\,\hat{i} - 176.78\,\hat{j} + 125\,lb\,\hat{k}$

$F_R = 125\,lb\,\hat{i} - 0.38\,lb\,\hat{j} - 479.8\,lb\,\hat{k}$

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HW04_#3

(Started in class) Given two vectors

$\vec{A} =< 2, 3, -6 > m$

$\vec{B} =< 0.5, -4, 3 > m$

A. Draw each vector in an oblique projection with the y axis pointing upwards

B. Find the dot product $\vec{A} \cdot \vec{B}$

C. Find the angle (0) between $\vec{A}$ and $\vec{B}$

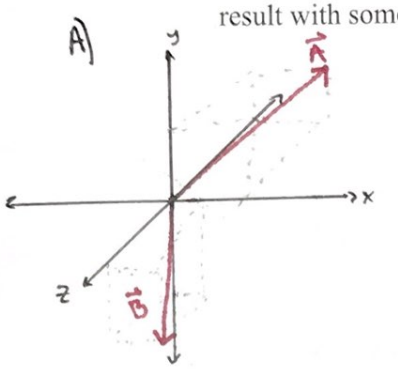
D. Find the magnitude of $\vec{A}$ which is in the direction of (or parallel to) $\vec{B}$

   a. Explain the significance of the negative sign

E. Find the vector projection of $\vec{A}$ onto $\vec{B}$ (which can be written $Proj_{\vec{B}}\vec{A}$ and is the vector portion of $\vec{A}$ which is parallel to $\vec{B}$)

F. Find the vector portion of $\vec{A}$ which is perpendicular to $\vec{B}$ (hint: remember that $\vec{A}$, $\vec{B}$, $Proj_{\vec{B}}\vec{A}$, and the answer to this problem are in the same spatial plane. You can find this result with some straighforward vector subtraction)

A)



B) $\vec{A} \cdot \vec{B} = (2 \cdot 0.5) + (3 \cdot -4) + (-6 \cdot 3) = \boxed{-29}$

C) $-29 = (7)(5.025)\cos(\theta)$

$\boxed{\theta = 145.53^\circ}$

D) $\vec{A} \cdot \left(\frac{\vec{B}}{\|B\|}\right) = <2, 3, -6> \cdot <0.0995, -0.796, 0.597>$

$= \boxed{-5.7712}$, THEY ARE ~~90°~~ APART

E) $\text{Proj}_B A = \frac{(-29)<0.5, -4, 3>}{(5.025)^2}$

$= \boxed{<-0.574, 4.594, 4.938>}$

F)

$<2, 3, -6> - <-0.574, 4.594, 4.938> = A \perp B$

$\boxed{A \perp B = <2.574, -1.594, -10.938>}$