Assessment1.22.4

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Assessment 1
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Math 163

Name: key

Suppose a contradiction were to be found in the axioms of set theory. Do you seriously believe that a bridge would fall down?

Frank Ramsey
1903 – 1930 (English mathematician)

No work = no credit
No CAS Calculators

Warm-ups (1 pt each): $-4^2 =$ -16 $-\frac{0}{4} =$ 0 $\vec{i}+\vec{j} =$ $\langle 1,1\rangle$ or $\langle 1,1,0\rangle$

1.) (1 pt) In addition to infinity, one of the topics in the philosophy of math is called "axiomatic set theory." According to Ramsey (above), how seriously ought we be concerned by the possibility of a contradiction arising in set theory? Answer using complete English sentences.

Ramsey does not believe that a contradiction would adversely impact the natural world.

2.) (8 pts) Answer the following:

a.) Find the equation of the sphere that passes through the point $(4,5,-3)$ and $(3,6,3)$ centered at

① find radius.

$D = \sqrt{1^2+1^2+6^2} = \sqrt{38}$

② sphere

$(x-3)^2+(y-6)^2+(z-3)^2 = 38$

b.) Write the inequality that describes the spherical solid whose surface includes the point $(4,5,-3)$ that is centered at $(3,6,3)$

same as above, but includes radii $\leq \sqrt{38}$

$(x-3)^2+(y-6)^2+(z-3)^2 \leq 38$

3.) (10 pts) If $\bar{a} = \langle 3, -4 \rangle$ and $\bar{b} = \langle -5, 2 \rangle$, find the following.

a.) $\bar{a} + \bar{b}$ $= \langle -2, -2 \rangle$

b.) $2\bar{a} + 3\bar{b}$ and express the result in terms of $\bar{i}$ and $\bar{j}$

$2\langle 3, -4 \rangle + 3\langle -5, 2 \rangle = \langle -9, -2 \rangle$

c.) $|\bar{a}| = \sqrt{9+16} = 5$

d.) $|\bar{a} - \bar{b}|$ $= |\langle 8, -6 \rangle| = \sqrt{64+36} = 10$

e.) Find a unit vector in the same direction as $\bar{a}$ $\left\langle \frac{3}{5}, \frac{-4}{5} \right\rangle$

4.) (4 pts) ~~Ropes~~ wires 3 ft and 5 ft in length are fastened to a Texas Star that is suspended over a town square. The star has a mass of 4 ~~kg~~. The ropes, fastened at different heights, make angles of 52° and 40° with the horizontal. Find the tension in each wire and the magnitude of each tension. (Round your answers to two decimal places.) <--- 4 kgs

$\langle |\vec{T}_1| \cos 40^\circ, |\vec{T}_1| \sin 40^\circ \rangle +$

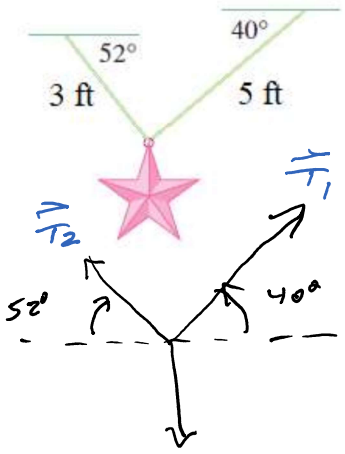
$\langle |\vec{T}_2| \cos 128^\circ, |\vec{T}_2| \sin 128^\circ \rangle +$

$\langle 0, -4 \rangle = \langle 0, 0 \rangle$

$\Rightarrow \begin{bmatrix} \cos 40^\circ & \cos 128^\circ & 0 \\ \sin 40^\circ & \sin 128^\circ & 4*9.81 \end{bmatrix}$

RREF

$= \begin{bmatrix} 1 & 0 & 30.05 \\ 0 & 1 & 24.15 \end{bmatrix}$



Note: The lengths are irrelevant !!

~~XXXXX~~ 4 kgs -> 4*9.81N

$\Rightarrow |\vec{T}_1| = 30.05$ lbs and $\vec{T}_1 = 30.05\langle \cos 40^\circ, \sin 40^\circ \rangle = \langle 23.02, 19.32 \rangle$

$|\vec{T}_2| = 24.15$ lbs and $\vec{T}_2 = 24.15\langle \cos 128^\circ, \sin 128^\circ \rangle = \langle -14.87, 19.03 \rangle$