

100	90's	80's	70's	60's	< 60
2	5	8	15	3	8

Assessment 1
Dusty Wilson
Math 163

high 100

Name: key

~~work~~

$$\bar{x} = 82.6\%$$

It appears to me that if one wishes to make progress in mathematics, one should study the masters and not the pupils.

No work = no credit

$$\text{median} = 79.2\%$$

Niels Henrik Abel

1802 - 1829 (Norwegian mathematician)

Warm-ups (1 pt each):

$$2+2 = \underline{4}$$

$$-2^2 = \underline{-4}$$

$$\bar{k} = \underline{\langle 0, 0, 17 \rangle}$$

1.) (1 pt) According to Abel (above), who should we learn from? Answer using complete English sentences.

We should learn from the experts/masters.

2.) (6 pts) If $\vec{u} = \langle 0, -4, 5 \rangle$ and $\vec{v} = \langle -1, 1, 2 \rangle$ find the following:

a.) $|\vec{u}| = \sqrt{0 + 16 + 25} = \sqrt{41}$

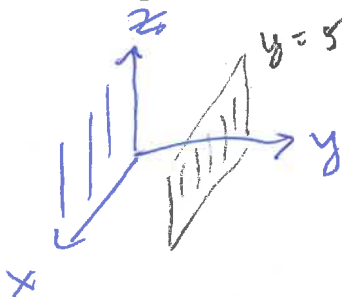
b.) $3\vec{v} = \langle -3, 3, 6 \rangle$

c.) $\vec{u} - \vec{v} = \langle 1, -5, 3 \rangle$

d.) $2\vec{u} + 4\vec{v} = \langle -4, -4, 18 \rangle$

e.) Find a unit vector parallel to $\vec{u} = \frac{1}{\sqrt{41}} \langle 0, -4, 5 \rangle$

3.) (2 pts) Write an inequality to describe the region between the xz -plane and the vertical plane $y = 5$.



$$0 < y < 5$$

4.) (4 pts) Consider the two points $P(1,0,1)$ and $Q(3,2,0)$.

a.) Find a vector \vec{w} with representation given by the directed line segment \overrightarrow{PQ} . Write your answer using $\vec{i}, \vec{j}, \vec{k}$ notation.

$$\overrightarrow{PQ} = \langle 2, 2, -1 \rangle = 2\vec{i} + 2\vec{j} - \vec{k} = \vec{w}$$

b.) Find a vector parallel to \vec{w} but with length 4.

$$|\vec{w}| = \sqrt{4+4+1} = 3$$

so the vector would be $\frac{4}{3} \langle 2, 2, -1 \rangle$

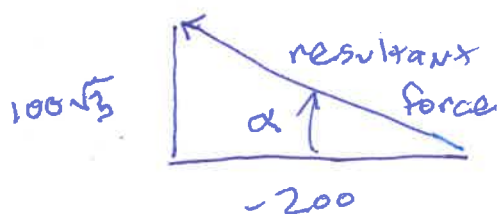
5.) (4 pts) Consider the two forces \vec{a} and \vec{b} that are pictured below and have respective magnitudes of 200N and 300N. Find the magnitude of the resultant force and the angle it makes with the positive x-axis.

$$\vec{a} = 200 \left\langle \frac{1}{2}, \frac{\sqrt{3}}{2} \right\rangle$$

$$\vec{b} = 300 \langle -1, 0 \rangle$$

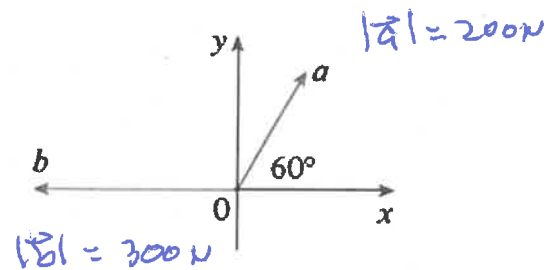
$$\vec{a} + \vec{b} = \langle -200, 100\sqrt{3} \rangle$$

$$\text{magnitude} = \sqrt{200^2 + 3(100)^2} = \sqrt{70,000} \approx 264.58 \text{ N}$$



$$\alpha = \arctan \frac{100\sqrt{3}}{200} \approx 40.9^\circ$$

And the angle made w/ the pos. x-axis is $180 - 40.9^\circ = 139.1^\circ$



6.) (4 pts) Find the center and radius of the sphere $x^2 + y^2 + z^2 + 6x - 4z + 1 = 0$

$$(x^2 + 6x + 9) + y^2 + (z^2 - 4z + 4) = -1 + 9 + 4$$

$$\Rightarrow (x+3)^2 + y^2 + (z-2)^2 = 12$$

center $(-3, 0, 2)$

radius $\sqrt{12}$