

Information about Recitation:

- ⇒ Each class will begin with Q + A about HW
- ⇒ late HW will be considered on a case by case basis
- ⇒ Any Questions about recitation need to be directed to me, not to Professor Walsh.

Class 1 Vector operations:

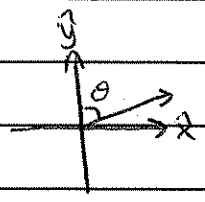
Representations: $\vec{F} = \langle x, y \rangle \Leftrightarrow x\hat{i} + y\hat{j} \Leftrightarrow x\hat{x} + y\hat{y}$
 Can also be described as magnitude and direction.

$|\vec{F}| = \sqrt{x^2 + y^2}$ describes magnitude
 $\tan \theta = \frac{y}{x}$ describes direction

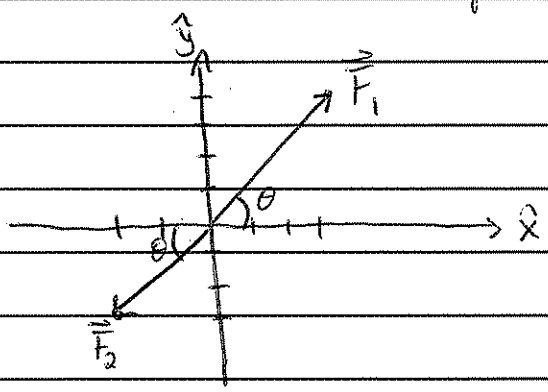
Example $\vec{F}_1 = \langle 3, 4 \rangle \Leftrightarrow 3\hat{i} + 4\hat{j} \Leftrightarrow 3\hat{x} + 4\hat{y}$ or

We can say $|\vec{F}_1| = \sqrt{3^2 + 4^2} = 5$ and is pointing in a direction $\tan \theta = \frac{4}{3} \Rightarrow \theta = 53^\circ$ N of E.

Is $\tan \theta = \frac{y}{x}$ always true?



Can also be represented as arrows in space.



Plot $\vec{F}_2 = \langle -2, -3 \rangle$ and describe using magnitude and direction

$|\vec{F}_2| = \sqrt{2^2 + 3^2} = \sqrt{13}$
 $\tan \theta = \frac{-3}{-2} \Rightarrow \theta = 33.7^\circ$ S of W

Find components from magnitude and direction.

Vector Operations:

$$\text{Addition: } \vec{F} + \vec{G} = \langle F_x, F_y \rangle + \langle G_x, G_y \rangle$$

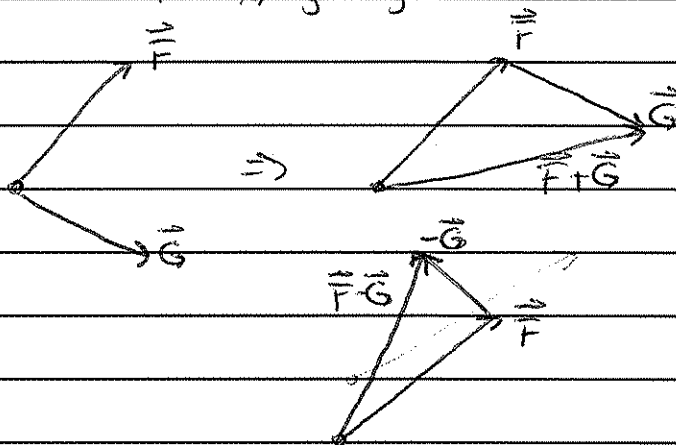
$$= \langle F_x + G_x, F_y + G_y \rangle$$

⇒ Add component wise

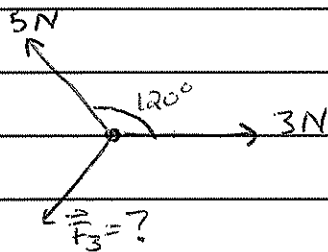
⇒ $|\vec{F}| + |\vec{G}| \neq$ correct addition of vectors

$$\text{Subtraction: } \vec{F} - \vec{G} = \langle F_x - G_x, F_y - G_y \rangle$$

Put totally:



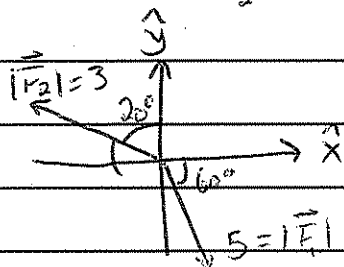
⇒ Add two vectors $|\vec{F}_1| = 5$ @ 60° S of E and $|\vec{F}_2| = 3$ @ 20° W of N
If time remains then work on problem 12



Express answer in all three vector forms.

$$\vec{F}_1 = \langle 5 \cos 60, 5 \sin 60 \rangle = \langle 2.5, -4.33 \rangle$$

$$\vec{F}_2 = \langle -3 \sin 20, 3 \cos 20 \rangle = \langle -1.03, 1.82 \rangle$$



$$\vec{F}_3 = \langle 1.47, -2.51 \rangle$$

$$\Rightarrow |\vec{F}_3| = 2.91 \text{ @ } \theta = 59.64^\circ \text{ S of E}$$