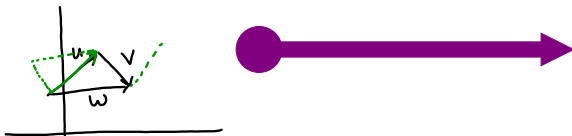**Write your hw questions on the whiteboard!**

$$u = w - v$$

Nov 20-5:16 PM

Oct 29-9:07 AM

# What do you think of when you hear the term "unit"?

Number 1

Nov 24-10:48 PM

**Definition.** A unit vector, **u**, is a vector with length 1.

**Q:** How do we denote the length of a vector **v**?

**A:** $\|v\|$

**Q:** Let's say $\|v\|=5$. What would we need to do to create a vector in the same direction as **v** but with length (or magnitude) equal to 1?

**A:** divide by 5

Nov 24-10:49 PM

To find a unit vector **u** in the direction of **v**:

$$\frac{\vec{v}}{\|v\|} \quad \text{or} \quad \frac{1}{\|v\|} \cdot \vec{v}$$

**Example**

Find a unit vector in the direction of $\bar{v} = \langle 3, -4 \rangle$, then verify it has a length of 1.

$$\frac{\langle 3, -4 \rangle}{5} = \frac{1}{5} \cdot \langle 3, -4 \rangle = \left\langle \frac{3}{5}, \frac{-4}{5} \right\rangle$$

$$\|v\| = \sqrt{3^2 + (-4)^2}$$
$$= \sqrt{9 + 16}$$
$$= \sqrt{25}$$
$$= 5$$

$$\|v\| = \sqrt{\left(\frac{3}{5}\right)^2 + \left(\frac{-4}{5}\right)^2}$$
$$= \sqrt{\frac{9}{25} + \frac{16}{25}} = \sqrt{\frac{25}{25}} = 1$$

p. 434, #35 (HW)

Nov 24-10:54 PM

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**2 Forms of a Vector**

$i = \langle 1, 0 \rangle \quad j = \langle 0, 1 \rangle$

1) Component Form: $\langle v_1, v_2 \rangle$   Horizontal / vertical

2) Linear Combination: $v_1 \vec{i} + v_2 \vec{j}$

$$3\vec{i} + 7\vec{j} = \langle 3, 7 \rangle$$

EX. Given $\bar{v} = \langle 4, 7 \rangle$ prove $4\mathbf{i} + 7\mathbf{j}$ is the linear combo.

$$4\langle 1, 0 \rangle + 7\langle 0, 1 \rangle$$
$$\langle 4, 0 \rangle + \langle 0, 7 \rangle = \langle 4, 7 \rangle$$

Nov 24-10:59 PM

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Find a vector **v** with the given magnitude and the same direction as **u**.

① Unit vector
② Multiply

$\|v\| = 10$    $u = 3i + 4j$

$$\text{unit vector} = \frac{\langle 3, 4 \rangle}{5} = \frac{1}{5}\langle 3, 4 \rangle = \left\langle \frac{3}{5}, \frac{4}{5} \right\rangle$$

$$\|u\| = \sqrt{3^2 + 4^2}$$
$$= \sqrt{25}$$
$$= 5$$

$$10 \left\langle \frac{3}{5}, \frac{4}{5} \right\rangle$$
$$\langle 6, 8 \rangle$$

p. 434, #47 (HW)

Nov 26-2:56 PM

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# HOMEWORK

...all of 6.3 will be due on Monday; the underlined portion is what we went over today...

**6.3 (p. 433):** 1-33 (odd), 35-59 (odd), 61-81 (odd, omit 77)

Nov 24-10:42 PM