Example #1 p. 2 Ch. 9

Find the magnitude and direction of $\mathbf{u} = \langle -5, 4 \rangle$

• First find the magnitude $c^2 = a^2 + b^2$ Step 1: a is the 1st term in the position vector a = -5& $a^2 = 25$

Step 2: b is the 2nd term in the position vector

$$b = 4 \& b^2 = 16$$

So,
$$c = \sqrt{c^2} = \sqrt{a^2 + b^2}$$

 $c = \sqrt{25 + 16} = \sqrt{41}$

Remember that distances are always positive so we only use the positive root

Finding direction of u = <-5, 4>

• Next find the direction, which is $\tan \theta = \frac{b}{a}$ $\tan \theta = \frac{4}{-5}$ So, $\theta = \tan^{-1}(\frac{4}{-5}) \approx -38.7^{\circ}$

which means in QII where <-5, 4> lies the reference angle is 38.7° , so $180^{\circ} - 38.7^{\circ} = 141.3^{\circ}$

• Thus, Magnitude $| u | = \sqrt{41}$ & Direction $\theta \approx 141.3^{\circ}$