LAC 2014 (101)

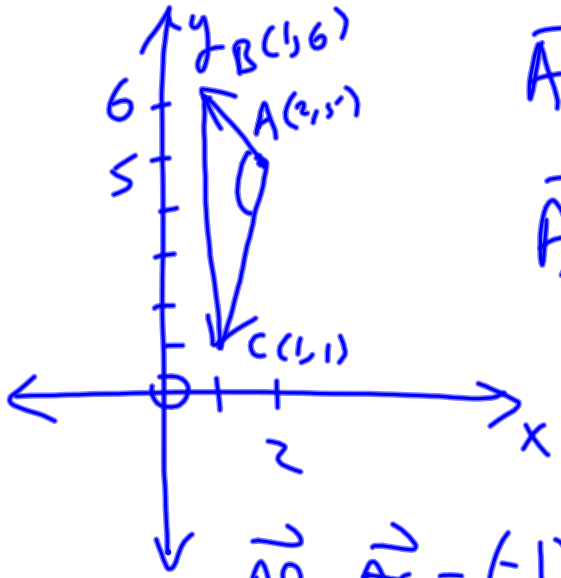
(1) $\vec{u} = \langle 1, 1 \rangle \quad \vec{v} = \langle -2, 6 \rangle \quad \vec{w} = \langle 4, 2 \rangle$

$\vec{u} - \vec{v} = \langle 3, -5 \rangle \quad \vec{u} + \vec{w} = \langle 5, 3 \rangle$

$3(\vec{u} - \vec{v}) = \langle 9, -15 \rangle \quad -\frac{1}{2}(\vec{u} + \vec{w}) = \langle -\frac{5}{2}, -\frac{3}{2} \rangle$

$3(\vec{u} - \vec{v}) - \frac{1}{2}(\vec{u} + \vec{w}) = \langle \frac{13}{2}, -\frac{33}{2} \rangle$

(2)



$\vec{AB} = \langle 1, 1 \rangle$

$\vec{AC} = \langle -1, -4 \rangle$

$\vec{AB} \cdot \vec{AC} = (1)(-1) + (1)(-4) = -3$

$\vec{AB}$
$\langle 1, 1 \rangle$

$\vec{AC}$
$\langle -1, -4 \rangle$

$\vec{AB} \cdot \vec{AC} = |\vec{AB}||\vec{AC}| \cos\theta$

$-3 = \sqrt{2}\sqrt{17} \cos\theta$

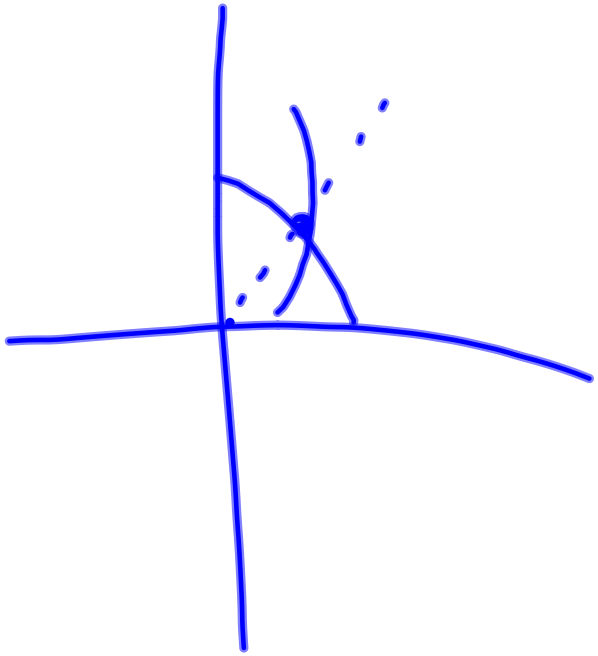
$\cos\theta = \frac{-3}{\sqrt{2}\sqrt{17}}$

$\theta = \cos^{-1}\left(\frac{-3}{\sqrt{2}\sqrt{17}}\right) \doteq 120.964^\circ$

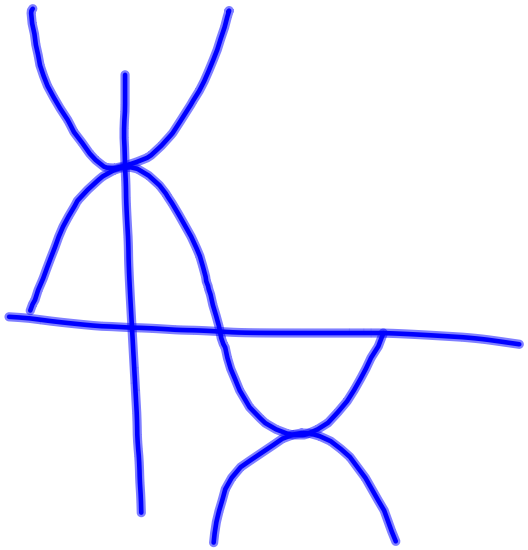
$y = \cos(x)$

$y = \cos^{-1}(x)$

$(\cos(x))^{-1}$



$\frac{1}{\cos(x)} = \sec(x)$



$$A = \frac{ab \sin C}{2}$$

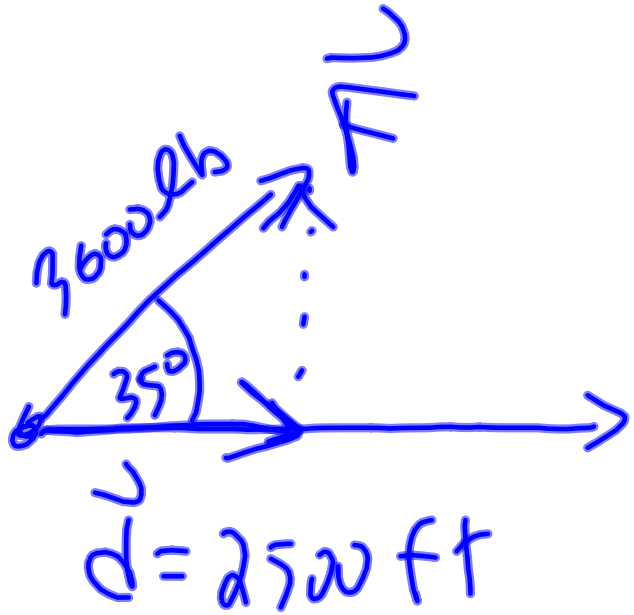
$$= \frac{\sqrt{2}\sqrt{17} \sin(120.964^\circ)}{2}$$

$$\doteq 2.5$$

③ $W = \vec{F} \cdot \vec{d}$

$\vec{F} = 3600 \angle 35°$

$\vec{d} = 2500 \angle 0°$



$\vec{F} \cdot \vec{d} = (3600)(2500)(\cos 35°)$

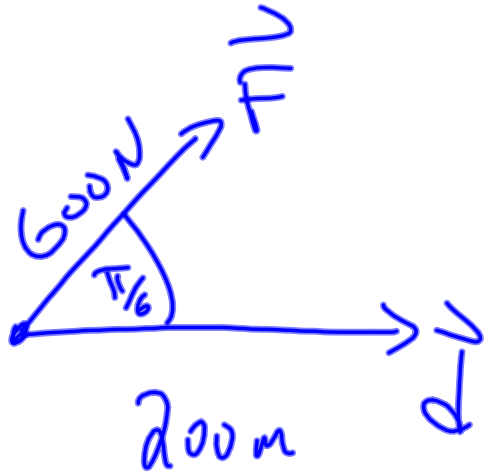
$\doteq 7372368.399$ ft-lb

(4)

$\vec{F} = 600 \angle \pi/6$

$= \langle 600\cos\pi/6, 600\sin\pi/6 \rangle$

$= \langle 300\sqrt{3}, 300 \rangle$



$\vec{d} = 200 \angle 0^\circ = \langle 200, 0 \rangle$

$W = \vec{F} \cdot \vec{d} = 60000\sqrt{3} + 0 = 60000\sqrt{3}$ Nm

$\doteq 103923.049$ N-m