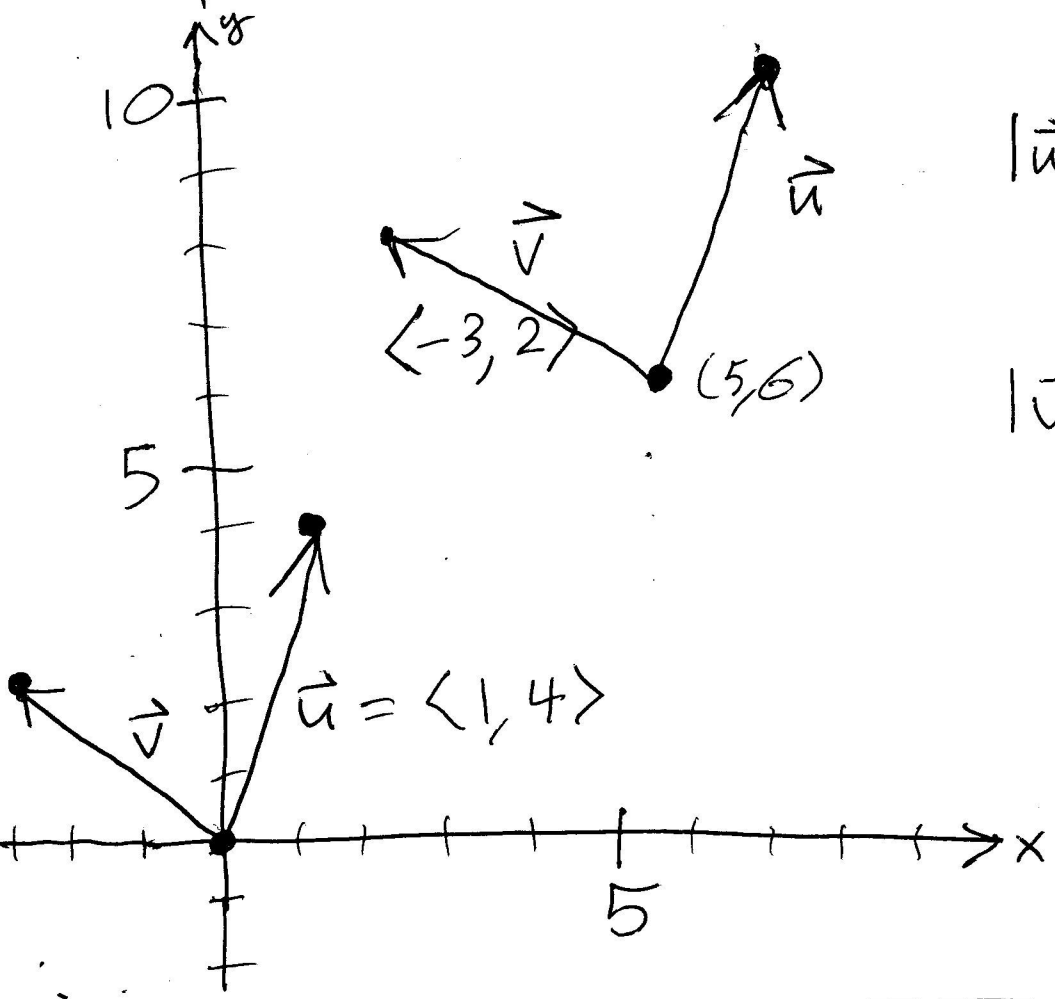
HW 1



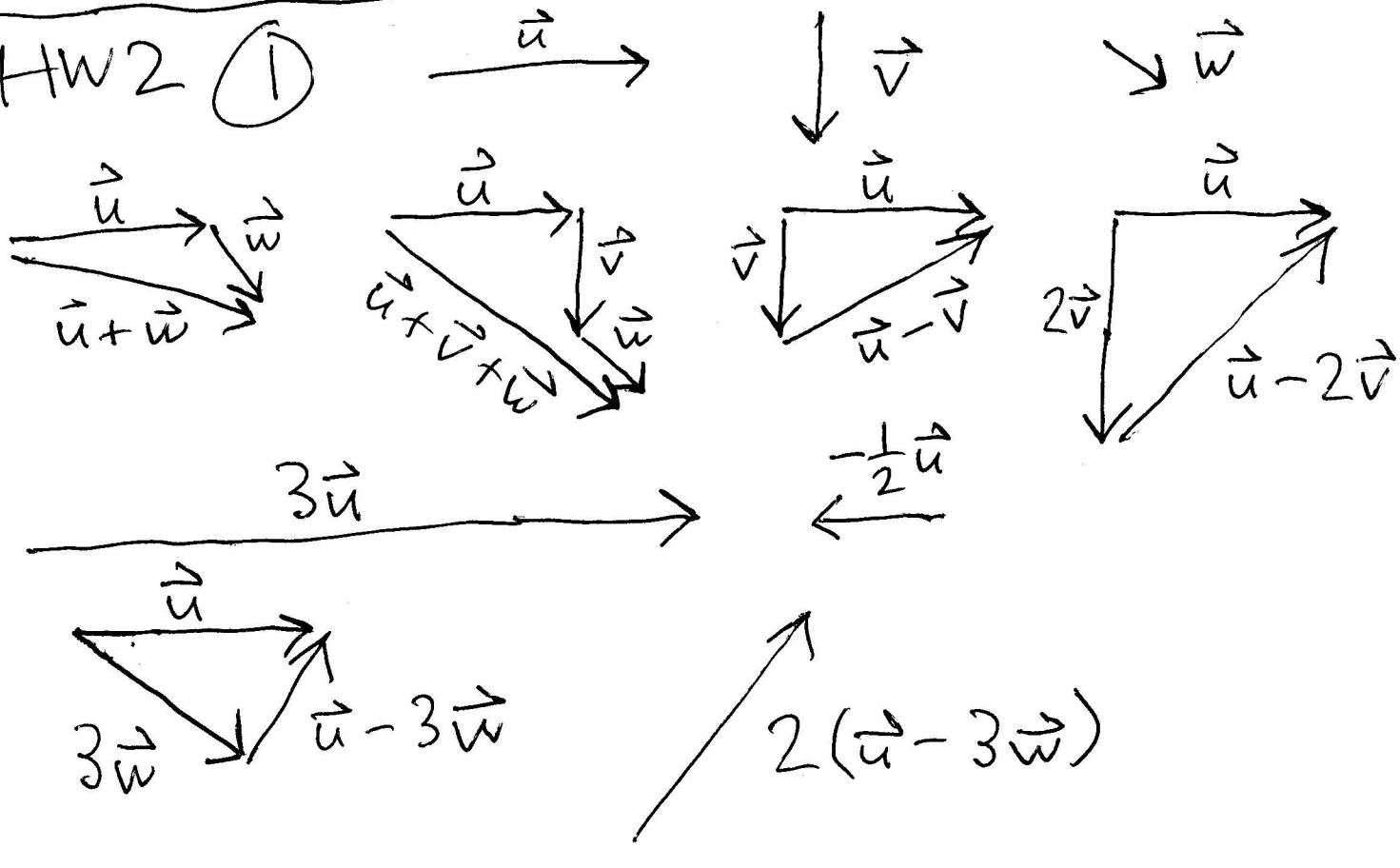
$|\vec{u}| = \sqrt{1^2 + 4^2}$

≈ 4.12

$|\vec{v}| = \sqrt{3^2 + 2^2}$

≈ 3.61

HW 2 (1)



HW 2 (2) $|\vec{i} - 5\vec{j}| = |\langle 1, -5\rangle| = \sqrt{1^2 + 5^2}$

≈ 5.10

$|-5\vec{j}| = |\langle 0, -5\rangle| = 5$

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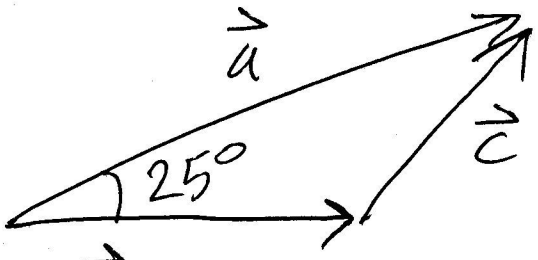
(3)



$|\vec{a}| = 15$

$|\vec{c}| = ?$

$\vec{b} + \vec{c} = \vec{a}$, so:

$$\boxed{\vec{c} = \vec{a} - \vec{b}}$$

$\vec{a} = \langle 15\cos 25^\circ, 15\sin 25^\circ \rangle$

$\vec{b} = \langle 10, 0 \rangle$

$\vec{c} = \vec{a} - \vec{b} = \langle 15\cos 25^\circ - 10, 15\sin 25^\circ \rangle$

$$|\vec{c}| = \sqrt{(15\cos 25^\circ - 10)^2 + (15\sin 25^\circ)^2}$$

≈ 7.29

(Alternatively, use the Law of Cosines:

$|\vec{c}| = \sqrt{15^2 + 10^2 - 2 \cdot 15 \cdot 10 \cos 25^\circ} \approx 7.29.$)

HW 3 ①

$$\frac{\langle 5,1\rangle}{|\langle 5,1\rangle|} = \left\langle \frac{5}{\sqrt{26}}, \frac{1}{\sqrt{26}} \right\rangle \approx .981\vec{i} + .196\vec{j}$$

$$\frac{\langle -1,6,-3\rangle}{|\langle -1,6,-3\rangle|} = \left\langle \frac{-1}{\sqrt{46}}, \frac{6}{\sqrt{46}}, \frac{-3}{\sqrt{46}} \right\rangle$$

$$\approx -.147\vec{i} + .885\vec{j} - .442\vec{k}$$

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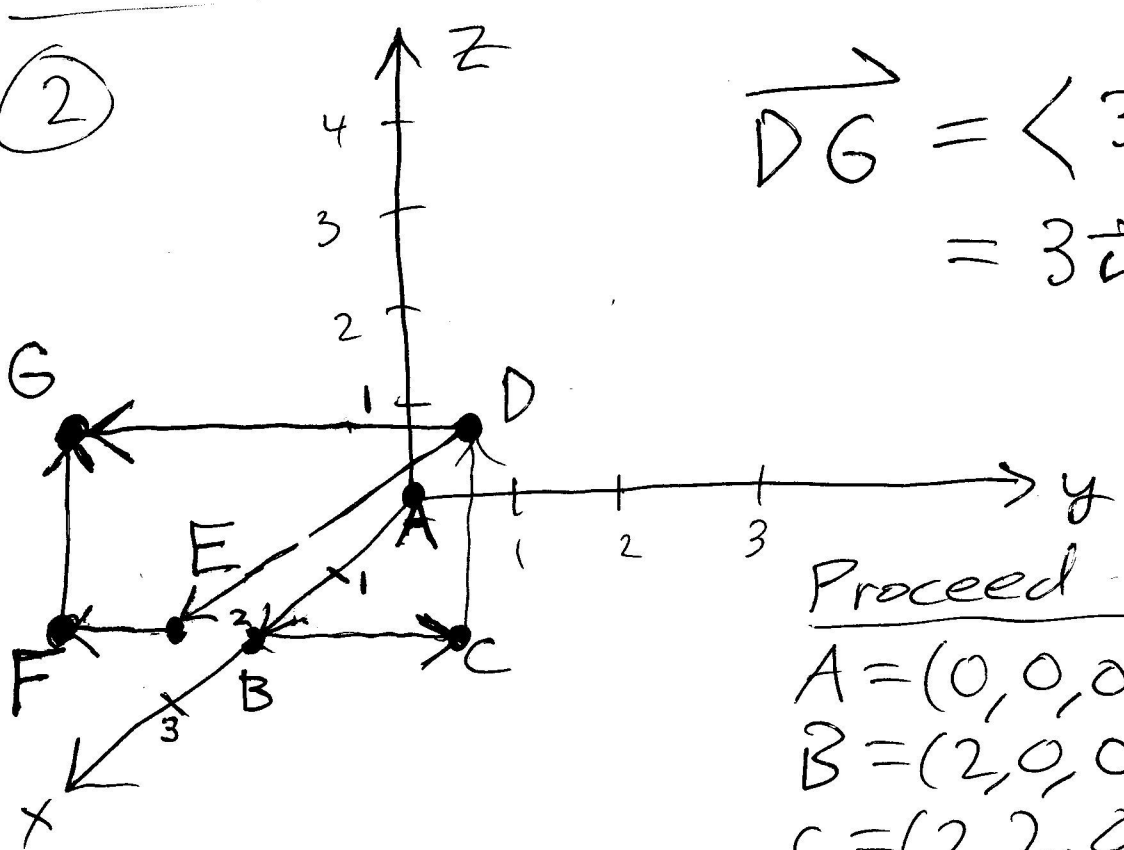
②



$$\overrightarrow{DG} = \langle 3, -1, 2\rangle = 3\vec{i} + (-\vec{j}) + 2\vec{k}$$

Proceed by simple steps:

$A = (0,0,0)$	$E = (5,2,2)$
$B = (2,0,0)$	$F = (5,1,2)$
$C = (2,2,0)$	$G = (5,1,4)$
$D = (2,2,2)$	

$\overrightarrow{AB} = 2\vec{i}$	$\overrightarrow{CD} = 2\vec{k}$	$\overrightarrow{EF} = -\vec{j}$
$\overrightarrow{BC} = 2\vec{j}$	$\overrightarrow{DE} = 3\vec{i}$	$\overrightarrow{FG} = 2k$

HW4 $\vec{u} = \langle 1, 2, 3 \rangle$ $\vec{v} = \langle 6, 5, 4 \rangle$

$$\angle(\vec{u}, \vec{v}) = \cos^{-1}\left(\frac{\vec{u} \cdot \vec{v}}{|\vec{u}||\vec{v}|}\right)$$

$$= \cos^{-1}\left(\frac{1 \cdot 6 + 2 \cdot 5 + 3 \cdot 4}{\sqrt{1^2+2^2+3^2}\sqrt{4^2+5^2+6^2}}\right)$$

$$= \boxed{\cos^{-1}\left(\frac{28}{\sqrt{14}\sqrt{77}}\right)}$$

$$\approx 0.5495$$

$$\approx 31.48^\circ$$

Without the degree symbol, radian is the assumed unit.