§6.5

(7) $\vec{u} = \langle 1, -2 \rangle$, $\vec{v} = \langle 3, 5 \rangle$

$$\vec{u} \cdot \vec{v} = (1)(3) + (-2)(5) = 3 + -10 = 7$$

(11) $\vec{u} = \vec{i} - 3\vec{j}$, $\vec{v} = 8\vec{i} - 2\vec{j}$

$$\vec{u} \cdot \vec{v} = (1)(8) + (-3)(-2) = 8 + 6 = 14$$

(15) $\|\vec{u}\| = 2$, $\|\vec{v}\| = 5$, $\theta = \pi/6$ find $\vec{u} \cdot \vec{v}$

$$\vec{u} \cdot \vec{v} = \|\vec{u}\| \|\vec{v}\| \cos\theta = 2 \cdot 5 \cos \pi/6 = 10 \cdot \frac{\sqrt{3}}{2} = 5\sqrt{3}$$

(21) $\vec{v} = \langle 2, 3 \rangle$, $\vec{w} = \langle 3, 4 \rangle$ find angle between them

$$\cos\theta = \frac{\vec{v} \cdot \vec{w}}{\|\vec{v}\| \|\vec{w}\|} = \frac{(2)(3) + (3)(4)}{\sqrt{4+9}\ \sqrt{9+16}} = \frac{18}{\sqrt{13} \cdot 5}$$

$$\theta = \cos^{-1}\left(\frac{18}{\sqrt{13} \cdot 5}\right) = 3.179° \sim 3.2°$$

(37) $\vec{v} = 2\vec{i} + 3\vec{j}$, $\vec{w} = -3\vec{i} + 2\vec{j}$

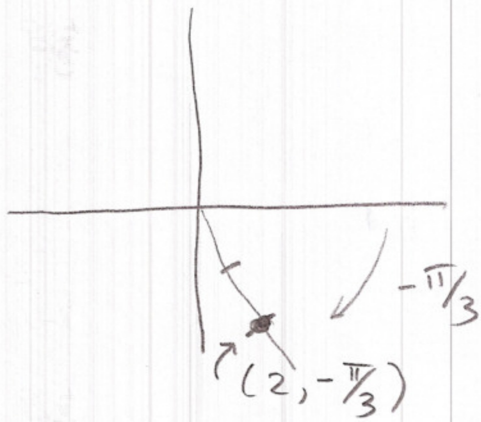
$$\vec{v} \cdot \vec{w} = (2)(-3) + (3)(2) = 0$$

yes, these are orthogonal

§6.6

(15) Plot $(2, -\pi/3)$

a) $(2, 5\pi/3)$
b) $(-2, 2\pi/3)$



(23) convert $(3, 60°)$ to rectangular

$x = 3\cos 60° = 3 \cdot \frac{1}{2} = \frac{3}{2}$
$y = 3\sin 60° = 3\,\frac{\sqrt{3}}{2} = \frac{3\sqrt{3}}{2}$

$\left(\frac{3}{2}, \frac{3\sqrt{3}}{2}\right)$

(31) $(1, -1)$

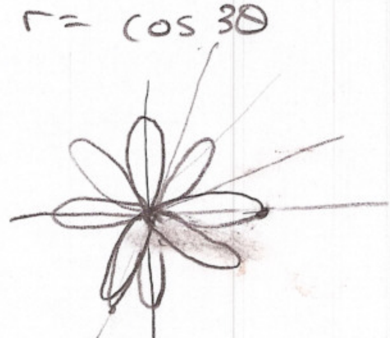
$r = \sqrt{1^2 + (-1)^2}$
$= \sqrt{2}$

$\tan\theta = -1$
$\theta = -\pi/4$ or $7\pi/4$ so $(\sqrt{2}, 7\pi/4)$

(43) $y^2 = 6y - x^2 \longrightarrow x^2 + y^2 = 6y$

$r^2 = 6r\sin\theta$
$r = 6\sin\theta$

(67) $r = \cos 3\theta$



θ	r
0	1
$\pi/6$	0
$\pi/4$	$-\sqrt{2}/2$
$\pi/3$	-1