

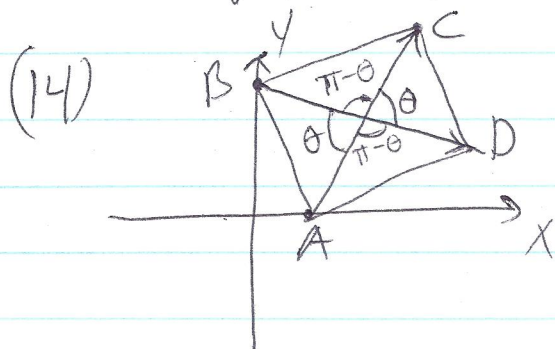
Math 243
Assignment 3
Solutions

Section 11.3:

$$(6) \vec{v} \cdot \vec{u} = -1 \cdot \sqrt{2} + 1 \cdot \sqrt{3} + 0 \cdot 2 \\ = \boxed{\sqrt{3} - \sqrt{2}}$$

$$|\vec{v}| = \sqrt{(-1)^2 + 1^2 + 0^2} = \boxed{\sqrt{2}}$$

$$|\vec{u}| = \sqrt{(\sqrt{2})^2 + (\sqrt{3})^2 + 2^2} = \sqrt{2+3+4} = \sqrt{9} = \boxed{3}$$



$$\vec{AC} = (3, 4) - (1, 0) = (2, 4)$$

$$\vec{BD} = (4, 1) - (0, 3) = (4, -2)$$

$$\vec{AC} \cdot \vec{BD} = 2 \cdot 4 + (-2) \cdot 4 = 0$$

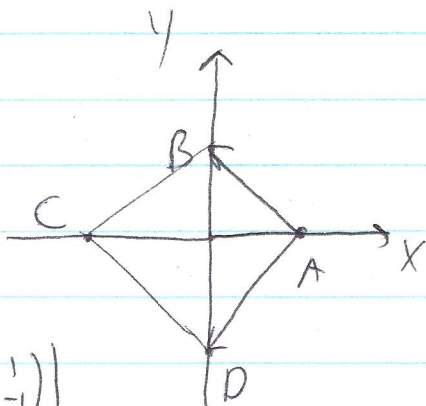
$$\text{so } \theta = \frac{\pi}{2}$$

so all angles are $\boxed{\frac{\pi}{2}}$!

Section 11.4:

$$(36) \vec{AB} = (-1, 1)$$

$$\vec{AD} = (-1, -1)$$



$$\text{Area} = \left| \det \begin{pmatrix} -1 & 1 \\ -1 & -1 \end{pmatrix} \right|$$

$$= |1 - (-1)|$$

$$= \boxed{2}$$

Oops! This is question 35. See the last page for question 36.

Open exercise:

(1) (a) $\vec{u} \cdot \vec{v} = -3 - 4 - 3 < 0$ so angle is obtuse

(b) $\vec{u} \cdot \vec{v} = -3 - 3 < 0$ so angle is obtuse

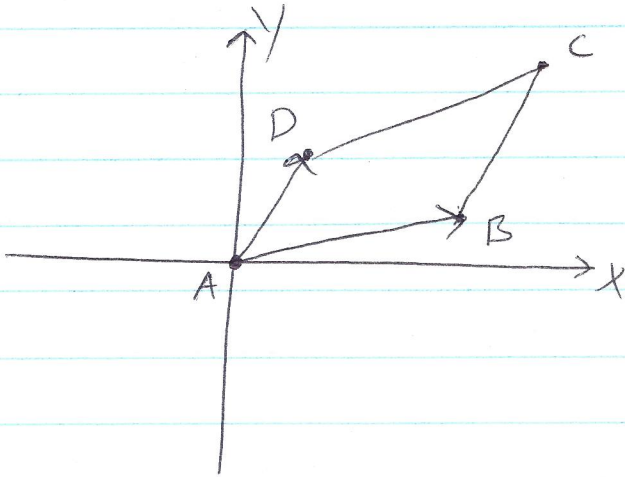
(c) $\vec{u} \cdot \vec{v} = -3 + 4 + 3 > 0$ so angle is acute

(3) #4:
$$\begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 1 & 1 & -1 \\ 0 & 0 & 0 \end{vmatrix} = \hat{i} \begin{vmatrix} 1 & -1 \\ 0 & 0 \end{vmatrix} - \hat{j} \begin{vmatrix} 1 & -1 \\ 0 & 0 \end{vmatrix} + \hat{k} \begin{vmatrix} 1 & 1 \\ 0 & 0 \end{vmatrix}$$
$$= \boxed{(0, 0, 0)}$$

#8:
$$\begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 3/2 & -1/2 & 1 \\ 1 & 1 & 2 \end{vmatrix} = \hat{i} \begin{vmatrix} -1/2 & 1 \\ 1 & 2 \end{vmatrix} - \hat{j} \begin{vmatrix} 3/2 & 1 \\ 1 & 2 \end{vmatrix} + \hat{k} \begin{vmatrix} 3/2 & -1/2 \\ 1 & 1 \end{vmatrix}$$
$$= (-2 - 1, -(3 - 1), 3/2 + 1/2)$$
$$= \boxed{(-3, -2, 2)}$$

Section 11.4:

(36)



$$\vec{AB} = (7, 3)$$

$$\vec{AD} = (2, 5)$$

$$\text{Area} = \left| \det \begin{pmatrix} 7 & 3 \\ 2 & 5 \end{pmatrix} \right|$$

$$= |35 - 6|$$

$$= \boxed{29}$$