Student: _____ **Date:** _____	**Instructor:** Joe Betters **Course:** Pre-Calculus Pre AP (Master Course)	**Assignment:** 9.7 Classwork Day 1

1. Find the value of the given determinant.

$$\begin{vmatrix} A & B & C \\ 4 & 1 & 3 \\ 1 & 4 & 1 \end{vmatrix}$$

$$\begin{vmatrix} A & B & C \\ 4 & 1 & 3 \\ 1 & 4 & 1 \end{vmatrix} = \_\_\_\_\_$$

(Simplify your answer.)

ID: 9.7.11

2. Find (a) $\mathbf{v} \times \mathbf{w}$, (b) $\mathbf{w} \times \mathbf{v}$, (c) $\mathbf{v} \times \mathbf{v}$, and (d) $\mathbf{w} \times \mathbf{w}$.

$\mathbf{v} = \mathbf{i} - 2\mathbf{j} + 3\mathbf{k}$, $\mathbf{w} = 2\mathbf{j} - \mathbf{k}$

(a) $\mathbf{v} \times \mathbf{w} =$ _____ (Type your answer in the form $a\mathbf{i} + b\mathbf{j} + c\mathbf{k}$.)

(b) $\mathbf{w} \times \mathbf{v} =$ _____ (Type your answer in the form $a\mathbf{i} + b\mathbf{j} + c\mathbf{k}$.)

(c) $\mathbf{v} \times \mathbf{v} =$ _____ (Type your answer in the form $a\mathbf{i} + b\mathbf{j} + c\mathbf{k}$.)

(d) $\mathbf{w} \times \mathbf{w} =$ _____ (Type your answer in the form $a\mathbf{i} + b\mathbf{j} + c\mathbf{k}$.)

ID: 9.7.19

3. Find $\mathbf{u} \times (\mathbf{v} \times \mathbf{v})$ for the given vectors.

$\mathbf{u} = 2\mathbf{i} - 3\mathbf{j} + \mathbf{k}$, $\mathbf{v} = -4\mathbf{i} + 4\mathbf{j} + 2\mathbf{k}$

$\mathbf{u} \times (\mathbf{v} \times \mathbf{v}) = a\mathbf{i} + b\mathbf{j} + c\mathbf{k}$ where

$a =$ _____, $b =$ _____, and $c =$ _____.

(Type exact values, in simplified form, using fractions and radicals as needed. Type 1, −1, or 0 when appropriate, even though these values are not usually shown explicitly when writing a vector in terms of its components.)

ID: 9.7.39

4. Find a vector orthogonal to both $\mathbf{u}$ and $\mathbf{j} + \mathbf{k}$.

$\mathbf{u} = 2\mathbf{i} - \mathbf{j} + 3\mathbf{k}$

Which of the following vectors is orthogonal to both $\mathbf{u}$ and $\mathbf{j} + \mathbf{k}$?

- ○ $-4\mathbf{i} + 2\mathbf{j} + 2\mathbf{k}$
- ○ $2\mathbf{i} - 4\mathbf{j} + 2\mathbf{k}$
- ○ $2\mathbf{i} + 4\mathbf{j} + 2\mathbf{k}$
- ○ $-4\mathbf{i} - 2\mathbf{j} + 2\mathbf{k}$

ID: 9.7.43

5. Find the area of the parallelogram with vertices P_1, P_2, P_3, P_4

$P_1 = (1,3,3)$, $P_2 = (1,2,5)$, $P_3 = (-2,0,-2)$, $P_4 = (-2,-1,0)$

The area of the parallelogram is _____ square units.
(Simplify your answer. Type an exact value, using fractions and radicals as needed.)

ID: 9.7.49

1. $-11A - B + 15C$

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2. $-4i + j + 2k$

   $4i - j - 2k$

   0

   0

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3. 0

   0

   0

---

4. $-4i - 2j + 2k$

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5. $\sqrt{166}$

9.7 classwork day 1

① $\begin{vmatrix} A & B & C \\ 4 & 1 & 3 \\ 1 & 4 & 1 \end{vmatrix}$

$\begin{vmatrix} 1 & 3 \\ 4 & 1 \end{vmatrix} A - \begin{vmatrix} 4 & 3 \\ 1 & 1 \end{vmatrix} B + \begin{vmatrix} 4 & 1 \\ 1 & 4 \end{vmatrix} C$

$(1-12)A - (4-3)B + (16-1)C$

$\boxed{-11A - B + 15C}$

② $v = i - 2j + 3k$
$w = 2j - k$

$\begin{vmatrix} i & j & k \\ 1 & -2 & 3 \\ 0 & 2 & -1 \end{vmatrix}$

a) $v \times w = (2-6)i - (-1-0)j + (2-0)k$

$= \boxed{-4i + j + 2k}$

b) $w \times v$

* $v \times w = -(w \times v)$

change signs $\boxed{4i - j - 2k}$

c) $v \times v = \boxed{0}$

d) $w \times w = \boxed{0}$

] cross product of itself is zero

9.7 classwork day 1 continued

③ Find $u \times (v \times v)$

$u = 2i - 3j + k$

$v = -4i + 4j + 2k$

$u \times (0) =$ $0i + 0j + 0k$

④ $u = 2i - j + 3k$

$v = j + k$

* cross product is orthogonal to both

$u \times v = (-1(1) - 1(3))i - (2(1) - 0(3))j + (2(1) - 0(-1))k$

$= -4i - 2j + 2k$ orthogonal to both

9.7 classwork day 1 continued

(5) $P_1 = (1,3,3)$

$P_2 = (1,2,5)$

$P_3 = (-2,0,-2)$

$P_4 = (-2,-1,0)$

$u = \overrightarrow{P_1P_2} = (1-1)i + (2-3)j + (5-3)k$

$u = 0i - j + 2k$

$v = \overrightarrow{P_1P_3} = (-2-1)i + (0-3)j + (-2-3)k$

$v = -3i - 3j - 5k$

$u \times v = 11i - 6j - 3k$

$\|u \times v\|$ = area

$= \sqrt{11^2 + (-6)^2 + (-3)^2} = \boxed{\sqrt{166}}$