Analysis H 2016/2017 – Deggeller / Hahn
Unit 4 Quiz 2 – Vectors

20/20

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Period: B

1. Find the area of the parallelogram that has vectors $\langle -3,1,4\rangle$ and $\langle 6,-5,2\rangle$ as 2 of its sides. Since you don't have a calculator, don't try to simplify (just stop when you have a numerically equivalent answer).

$$\begin{vmatrix} i & j & k \\ -3 & 1 & 4 \\ 6 & -5 & 2 \end{vmatrix} = i(2+9) - j(-6-24) + k(15-6)$$

$$\boxed{\sqrt{11^2+30^2+9^2}}$$

2. Plane P contains the points A=(0, 2, 6) and B=(1, 3, -2), and the vector $\vec{u} = \langle -3,1,4\rangle$.

a) Find a vector equation for plane P.

$$\langle x,y,z\rangle = \langle 0,2,6\rangle + a\langle 1,1,-8\rangle + b\langle -3,1,4\rangle$$

b) Plane Q is a plane that is a perpendicular bisector of line segment AB. Write the equation for plane Q in rectangular form.

$(.5, 2.5, 2)$

$\langle x,y,z\rangle = \langle .5, 2.5, 2\rangle + a\langle 0,8,1\rangle + b\langle 8,0,1\rangle$

$1(x) + (1)y + (-8)z = 0$

$\boxed{x+y-8z+13=0}$

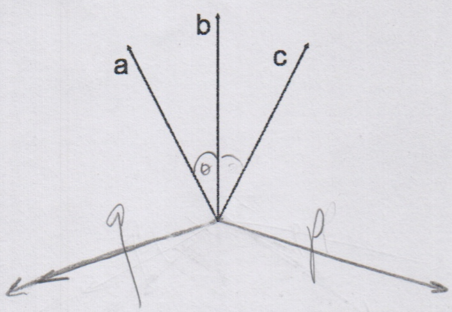
work on back →

$\langle 0,8,1\rangle$ $\langle 8,0,1\rangle$

3. STATEMENT 1: For vectors, the Associative Property is FALSE (that is, $(\vec{a}\times\vec{b})\times\vec{c} \neq \vec{a}\times(\vec{b}\times\vec{c})$).

In the diagram below, vectors **a**, **b**, and **c** are all have the same magnitude, and the angle between **a** and **b** is equal to the angle between **b** and **c**.

Let $\vec{p} = (\vec{a}\times\vec{b})\times\vec{c}$ and $\vec{q} = \vec{a}\times(\vec{b}\times\vec{c})$. Draw and label vectors p and q on the diagram, to prove STATEMENT 1. (You'll be graded on the directions of your answers, and their relative magnitudes to one another).



6. Circle "TRUE" or "FALSE" for each statement. Given that $(\vec{a}\times\vec{b})\bullet\vec{c} = 0$ ...

a) $\vec{a}$ and $\vec{b}$ must be orthogonal TRUE or FALSE

b) $\vec{a}$ and $\vec{c}$ must be orthogonal TRUE or FALSE

c) $(\vec{a}\times\vec{b})$ and $\vec{c}$ must be orthogonal TRUE or FALSE

d) $\vec{a}$, $\vec{b}$ and $\vec{c}$ must be coplanar TRUE or FALSE

$$\langle x, y, z \rangle = \langle .5, 2.5, 2 \rangle + a\langle 0, 8, 1 \rangle + b\langle 8, 0, 1 \rangle$$

$$x = \frac{1}{2} + 8b$$

$$y = 2.5 + 8a$$

$$z = 2 + a + b$$

$$z = 2 + \left(\frac{y - 2.5}{8}\right) + \left(\frac{x - \frac{1}{2}}{8}\right)$$

$$8z = 16 + y - 2.5 + x - \frac{1}{2}$$

$$8z = 16 - 3 + y + x$$

$$-x - y + 8z = 13$$