

## Math 171 Quiz 1

2/1/2007 Name: \_\_\_\_\_ UIN: \_\_\_\_\_

Show all work for full credit.

- (1) (6 points) (P70, #11) Find a) the length of  $\vec{a}$ , b) a unit vector having the same direction of  $\vec{a}$ ,  
c) scalars  $s$  and  $t$  such that  $\vec{c} = s\vec{a} + t\vec{b}$

$$\vec{a} = \langle 3, -4 \rangle, \vec{b} = \langle 1, 3 \rangle, \vec{c} = \langle 2, 1 \rangle$$

*Solution.* a)  $|\vec{a}| = \sqrt{(3)^2 + (-4)^2} = 5$

b)  $\vec{a}/|\vec{a}| = \langle 3/5, -4/5 \rangle$

c)  $\langle 2, 1 \rangle = \vec{c} = s\vec{a} + t\vec{b} = s\langle 3, -4 \rangle + t\langle 1, 3 \rangle = \langle 3s + t, -4s + 3t \rangle$ . So  
 $3s + t = 2, -4s + 3t = 1$ , and  $s = 5/13, t = 11/13$   $\square$

- (2) (4 points) (P111, #15) Prove the statement using the  $\epsilon, \delta$  definition of limit

$$\lim_{x \rightarrow 2} \frac{x}{7} = \frac{2}{7}$$

*Solution.* Given any  $\epsilon > 0$ , we take  $\delta = 7\epsilon$ . When  $|x - 2| < \delta$ ,  $|\frac{x}{7} - \frac{2}{7}| = |\frac{\delta}{7}| < \epsilon$ . Thus  
 $\lim_{x \rightarrow 2} \frac{x}{7} = \frac{2}{7}$  by definition.  $\square$