

## 231 Quiz 4

February 17, 2011

Name: \_\_\_\_\_

Name: \* Key \*

Name: \_\_\_\_\_

Work in groups but do not split up problems or tasks. You must discuss each problem as a group and agree on a final answer. Hand in one quiz per group.

You may use your hand-written Notebooks but no other materials and no technology at all. Please keep your discussions quiet so as not to disturb or inform other groups.

1. Write a delta-epsilon proof that shows that the function  $f(x) = 3x + 2$  is continuous at  $x = 4$ .

need to show that  $\lim_{x \rightarrow 4} (3x+2) = 3 \cdot 4 + 2 = 14$

in other words,

for all  $\epsilon > 0$ , there exists  $\delta > 0$  such that  
if  $0 < |x - 4| < \delta$ , then  $|(3x+2) - 14| < \epsilon$ .

proof.

given  $\epsilon > 0$ , choose  $\delta = \frac{\epsilon}{3}$ .

for all  $x$  with  $0 < |x - 4| < \delta$ , we must also have:

$$|(3x+2) - 14| = |3x - 12| = 3|x - 4| < 3\delta = 3\left(\frac{\epsilon}{3}\right) = \epsilon$$

thus

$$|(3x+2) - 14| < \epsilon,$$

as desired.  $\square$

by hyp.  $\uparrow$   
want  $3\delta = \epsilon$   
so choose  $\delta = \epsilon/3$