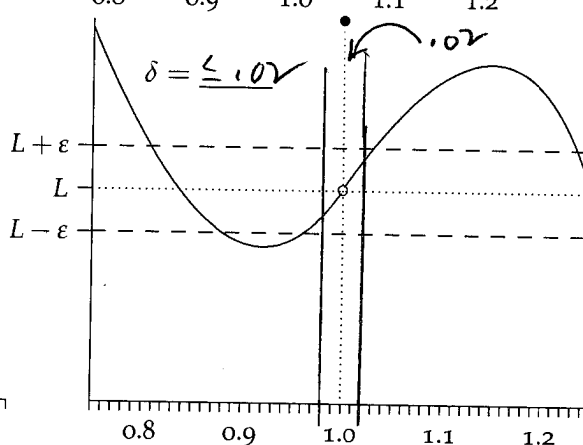
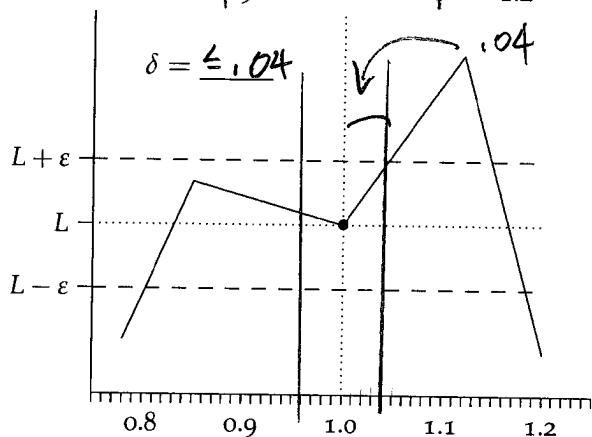
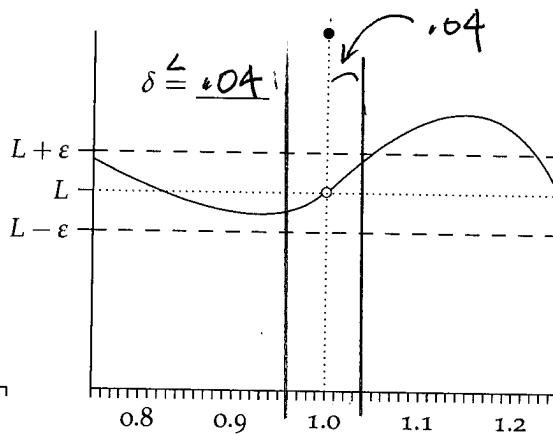
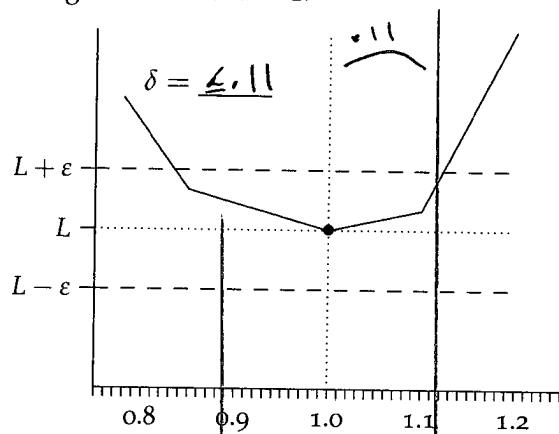


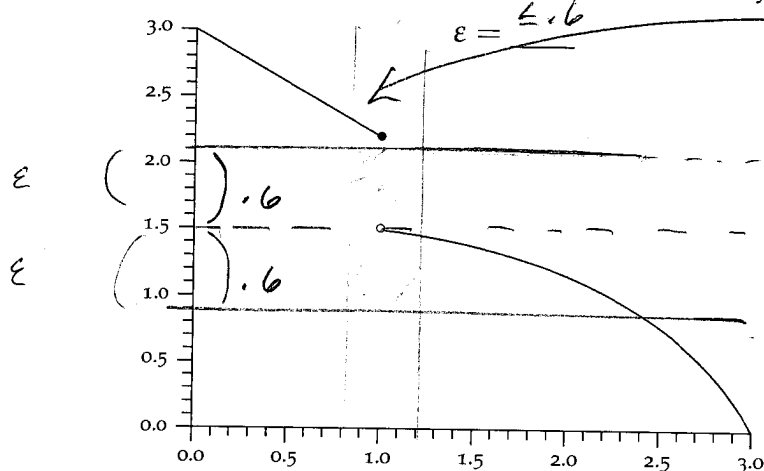
The Stuff You Need to Turn In Next Class. Name(s):

You should work with one partner if at all possible. If you do, hand in one sheet for both of you. Also remember: WeBWork Set Day08 due Monday night.

1. In each figure, for the given choice of ε , find and draw a δ interval (a vertical strip) about $a = 1$ which satisfies the limit definition. What is δ in each case? Note the scale. Note: In each figure, the same δ must work on both the left and right at sides of $a = 1$.



2. For the function $f(x)$ below, show that that 1.5 is **not** $\lim_{x \rightarrow 1} f(x)$. To do this, find and draw a horizontal ε interval about $y = 1.5$ for which there is **no** value of δ that will satisfy the limit definition. (For your value of ε , you can never trap $f(x)$ in the corresponding horizontal band.) What is the value of your ε ?



This part of the function is always outside the horizontal band no matter how small we make δ

3. (a) With your partner use the **formal definition** of limit to prove the following:

$$\lim_{x \rightarrow 10} 6x - 7 = 53.$$

Use the same type of careful argument that we made in class today with absolute values, ϵ , and δ . See Example 6.1.8.

SCRAP WORK: Find $\delta > 0$. $a = 10$, $L = 53$, $f(x) = 6x - 7$. Given $\epsilon > 0$.

Work backwards to $|x - a| = |x - 10|$

$$|f(x) - L| < \epsilon \xrightarrow{\text{translate}} |(6x - 7) - 53| < \epsilon$$

$$\xrightarrow{\text{simplify}} |6x - 60| < \epsilon$$

$$\xrightarrow{\text{Factor}} 6|x - 10| < \epsilon$$

$$|x - 10| < \boxed{\epsilon/6} \leftarrow \text{our } \delta$$

ARGUMENT:

Let $\epsilon > 0$ be given. Choose $\delta = \epsilon/6$

$\pm f$ $0 < |x - 10| < \epsilon/6$ then

$$|f(x) - L| = |(6x - 53) - 7| = |6x - 60| = 6|x - 10| < 6 \cdot \frac{\epsilon}{6} = \epsilon.$$

So if $0 < |x - 10| < \epsilon/6$, then $|(6x - 7) - 53| < \epsilon$

$$\delta = \epsilon/6$$

$$\epsilon' = 0.06$$

$$\delta = 0.06/6 = .01$$

(b) Suppose I told you that $\epsilon' = 0.06$. Use your work above to tell me what δ I should use.

(c) Suppose I told you that $\epsilon' = 0.0003$. Use your work above to tell me what δ I should use.

$$\delta = \epsilon'/6 = .0003/6 = .00005$$