Intermediate Value Theorem
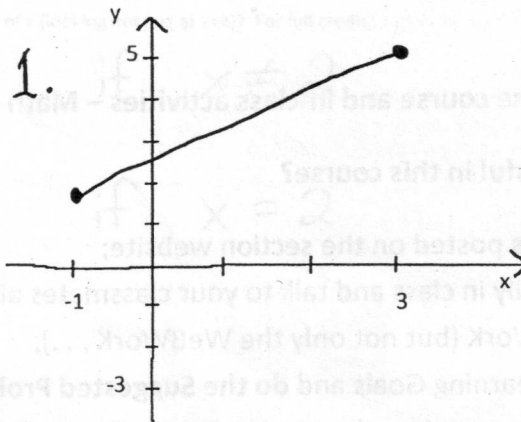
Thursday, September 20, 2012

Here are the graphs of five functions defined on the interval [-1,3].
For each case, decide:
- Does the function take the value of 4 on the interval [-1,3]?
- Does the function have a root (i.e. take the value zero) on the interval [-1,3]?
- For each of these values, does the Intermediate Value Theorem (IVT) apply?

IVT: If a function is defined and continuous on the interval [a,b], then it must take all intermediate values between f(a) and f(b) at least once; in other words, for any intermediate value L between f(a) and f(b), there must be at least one input value c such that f(c) = L.
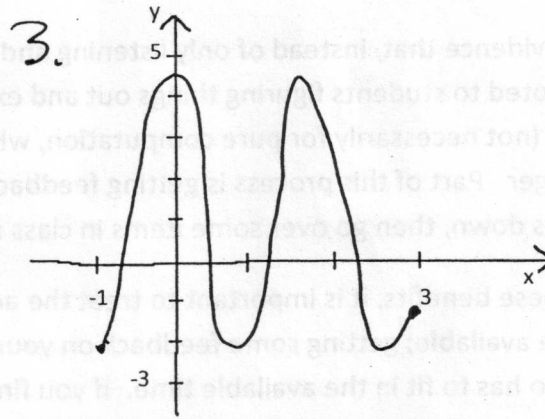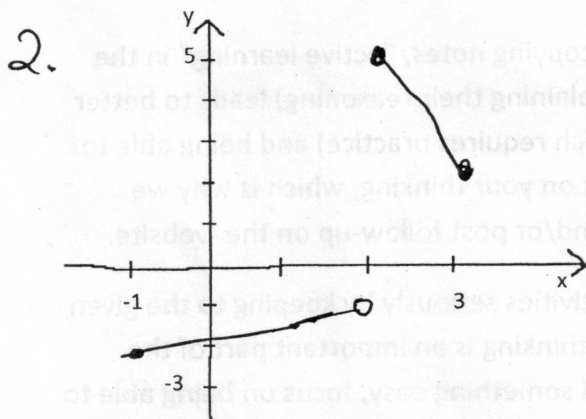
1.
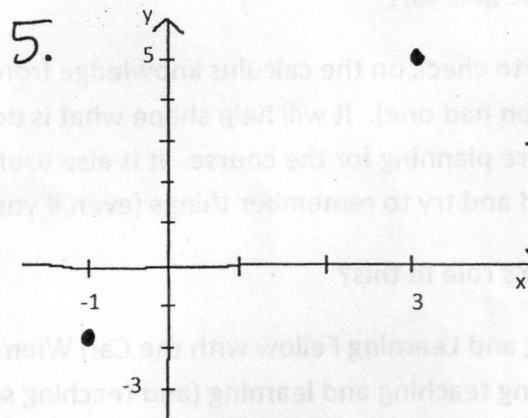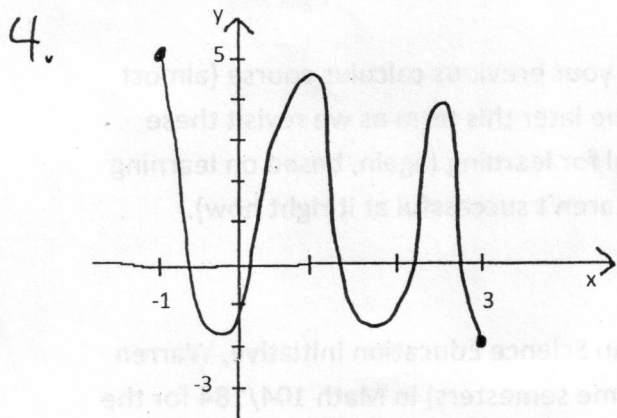
Does f(c)=4 for any c in [-1,3]?		Does IVT apply?	
Does f have a root on [-1,3]?		Does IVT apply?	

2.

Does f(c)=4 for any c in [-1,3]?		Does IVT apply?	
Does f have a root on [-1,3]?		Does IVT apply?	

3.

Does f(c)=4 for any c in [-1,3]?		Does IVT apply?	
Does f have a root on [-1,3]?		Does IVT apply?	

4.

Does f(c)=4 for any c in [-1,3]?		Does IVT apply?	
Does f have a root on [-1,3]?		Does IVT apply?	

5.

draw graph with
$f(-1) = -2$
$f(3) = 5$
and answers below are true

Does f(c)=4 for any c in [-1,3]?	Y	Does IVT apply?	Y
Does f have a root on [-1,3]?	Y	Does IVT apply?	Y

| What does the IVT tell you about function values on the interval that are not intermediate values?	
What does the IVT tell you about functions that are not continuous on the interval?	
What does the IVT tell you about where the c occurs in [a,b]?	
What does the IVT tell you about how many such c values there might be?	

Limits and Continuity Worksheet

Tuesday, September 18, 2012

Names and student numbers for group (minimum of 2):

1. _____
   _____

2. _____
   _____

3. _____
   _____

1. Use the graph of g(x) given in the figure to find the following values, if they exist. If a limit does not exist, explain why.
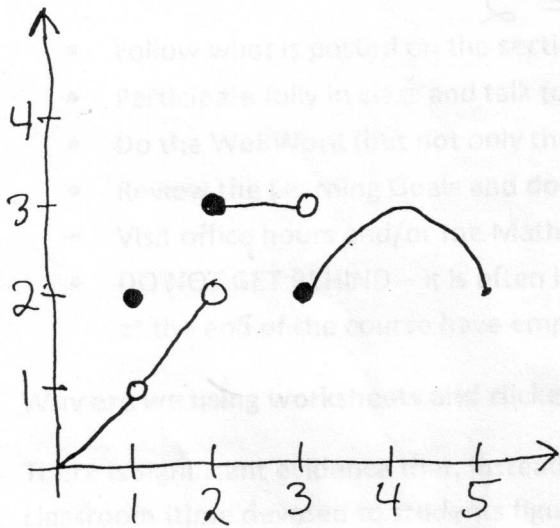
   i. $\lim\limits_{x\to 1} g(x)$

   ii. $\lim\limits_{x\to 2^-} g(x)$

   iii. $\lim\limits_{x\to 3} g(x)$

   iv. $\lim\limits_{x\to 4} g(x)$

2. For each of the graphs drawn below, determine where the function is continuous by using interval notation. If it is not continuous somewhere, give a reason why (try using limit notation for this).

i) $y = -\sqrt{4-x^2}$

ii) $y = \ln(x)$

iii)

$y = \begin{cases} x^2 & \text{if } x \neq 1 \\ 4 & \text{if } x = 1 \end{cases}$

iv)

$y = \begin{cases} x^2 & \text{if } x < 0 \\ x+1 & \text{if } x \geq 0 \end{cases}$