Entry #: ________

Lesson 1.2: Intermediate Value Theorem & Graphing Adjustments

Warm Up:

When an **indeterminate form** $\left(\text{usually } \frac{0}{0}\right)$ is obtained after trying to use direct substitution, it is necessary to use algebraic techniques to take change the form of the limit. Find the following limits.

1. $\lim_{x\to 0} \frac{x}{x(x+1)}$
2. $\lim_{x\to 2} \frac{x-2}{x^2-4}$
3. $\lim_{x\to 1} \frac{x^3-1}{x-1}$
4. $\lim_{x\to 1} \frac{\sqrt{x}-1}{x-1}$
5. $\lim_{x\to 2^+} \frac{x}{x-2}$

Intermediate Value Theorem:

If *f* is ________________ on $[a, b]$ and *k* is any real *y*-value between $f(a)$ and $f(b)$, then there is _________________ *x*-value **c** between **a** and **b** such that $f(c) = k$. In other words, *f* takes on every *y*-value between $f(a)$ and $f(b)$.

Example: Does the Intermediate Value Theorem guarantee a *c*-value on the given interval? If so, find the value of c.

a. $f(x) = x^2 - x$
$f(c) = 12, \quad [0,5]$

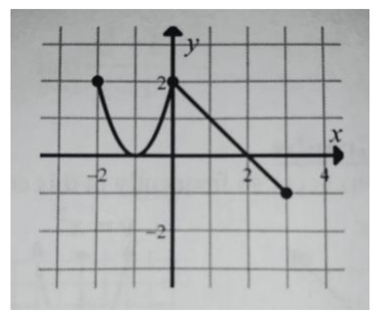
b. $g(x) = \frac{x^2-4}{x-2}$
$g(c) = 4, \quad [0,3]$

Graphing Adjustments to $y = f(x)$

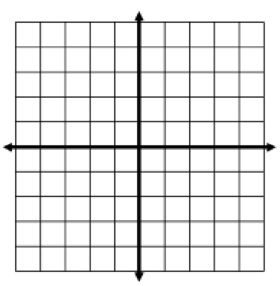
Any adjustment made to a function always produces a ______________________ .

Adjustment	**Result**
$y = -f(x)$	Reflect across the *x*-axis.
$y = f(-x)$	Reflect across the *y*-axis.
	Shift up if $d > 0$, shift down if $d < 0$.
$y = f(x + c)$	
$y = a \cdot f(x)$	
	Horizontal squeeze if $b > 1$, horizontal stretch if $b < 1$ (assuming b is positive, otherwise a reflection is needed).
$y = \lvert f(x) \rvert$	
$y = f(\lvert x \rvert)$	

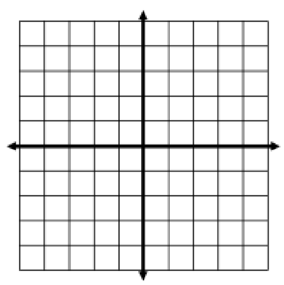
Examples: Use the graph of $y = f(x)$ shown to sketch the following.



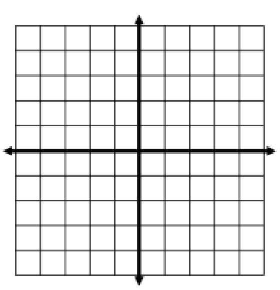
1. $y = f(x + 2)$



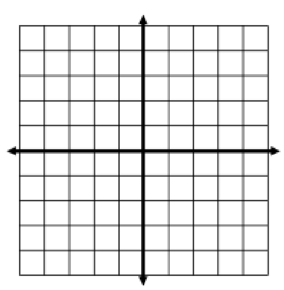
2. $y = -f(x) + 2$



3. $y = \lvert f(2x) \rvert$



4. $y = \frac{1}{2} f(-x)$



5. $y = f(\lvert x \rvert)$