# Math 1450, Honor Calculus Practice 1, Fall 2015.

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1. $f(x) = x + 1, g(x) = x^2 + 5x + 6$. Find $g \circ f$ and its domain.

$g\circ f = g(f(x)) = (x+1)^2+5(x+1)+6$

and domain of $g\circ f$ is $\mathbb{R}$ or $(-\infty,\infty)$ or $-\infty<x<\infty$.

2. Let $f(x) = x + 3$ and $h(x) = 4x - 5$. Find function $g$ such that $g \circ f = h$.

$h(x) = 4x-5 = 4(x+3)-12-5$

$= 4(f(x))-17.$

Since $h = g\circ f$ so $g(x) = 4x-17$.

3. Suppose $f$ and $g$ are odd funcitons. Are $f + g$ and $fg$ odd? Explain it!

Since $f$ and $g$ are odd, $f(x) = -f(x)$, $g(-x) = g(x)$

Then (1) $(f+g)(-x) = f(-x)+g(-x) = -f(x)-g(x) = -(f+g)(x) \Rightarrow$ odd.

(2) $(fg)(-x) = f(-x)g(-x) = [-f(x)][-g(x)] = f(x)g(x) = (fg)(x) \Rightarrow$ even

4. Find the limit $\lim_{x\to 0^+}\left(\frac{1}{x}-\frac{1}{|x|}\right)$ if it exists. If not, explain why?

Since $|x| = \begin{cases} x, & x\geq 0 \\ -x, & x<0 \end{cases}$, then.

$\lim_{x\to 0^+}\left(\frac{1}{x}-\frac{1}{|x|}\right) = \lim_{x\to 0^+}\left(\frac{1}{x}-\frac{1}{x}\right) = \lim_{x\to 0^+} 0 = 0$