Math 1450, Honor Calculus Practice 1, Fall 2015.

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1. $f(x) = x - 2, g(x) = x^2 + 3x + 4$. Find $g \circ f$ and its domain.

$$(g\circ f)(x) = g(f(x)) = (x-2)^2 + 3(x-2) + 4$$
$$= x^2 - 4x + 4 + 3x - 6 + 4$$
$$= x^2 - x + 2.$$

Domain of $g\circ f$: $D(g\circ f) = \mathbb{R}$ or $(-\infty, \infty)$ or $\{x \mid -\infty < x < \infty\}$

2. Find the domain of function $f(x) = \sqrt{x} + \sqrt[3]{x}$.

$D(\sqrt{x}) = [0, \infty)$, $D(\sqrt[3]{x}) = (-\infty, \infty)$

$\Rightarrow D(f) = [0, \infty) \cap (-\infty, \infty) = [0, \infty)$

3. Let $f(x) = x + 4$ and $h(x) = 4x - 1$. Find function g such that $g \circ f = h$.

$$4x - 1 = h(x) = g(f(x)) = \underbrace{4(x+4)}_{4x+16} - 17$$

$\Rightarrow g(x) = 4x - 17.$

4. Suppose f and g are odd fuicitons. Are $f + g$ and fg odd? Explain it!

f and g are odd functions $\Rightarrow f(-x) = -f(x)$, $g(-x) = -g(x)$

Then

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

② $(fg)(-x) = f(-x)\,g(-x) = [-f(x)]\cdot[-g(x)] = f(x)g(x) = (fg)(x)$

$\Rightarrow$ even.