DAY 8

Homework Quiz 2, 18 Feb 22 MA 131M

1. Find the domain of the function $g(x) = \sqrt{5-x}$.

We need $5 - x \geq 0$, so $x \leq 5$.

Interval notation: $(-\infty, 5]$

2. Let $f(x) = x^2 - 1$ and $g(x) = 2x + 1$. For each of the following, find the function and state its domain.

(a) $\frac{f}{g} = \frac{x^2-1}{2x+1}$

Domain: cannot have 0 in the denominator.

$2x + 1 = 0$

$2x = -1$

$x = -\frac{1}{2}$

all $x \neq -\frac{1}{2}$

$(-\infty, -\frac{1}{2}) \cup (-\frac{1}{2}, \infty)$

(b) $f \circ g$

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

$= (2x+1)^2 - 1 = 4x^2 + 4x + 1 - 1$

$= 4x^2 + 4x$

Domain: All real numbers

$(-\infty, \infty)$

3. Find $\lim_{x\to 0} \frac{2x}{\sin(6x)} \cdot \frac{3}{3} = \lim_{x\to 0} \frac{6x}{\sin(6x)} \cdot \frac{1}{3}$

CHECK: $\frac{0}{0}$

$= 1 \cdot \frac{1}{3} = \frac{1}{3}$

Use $\lim_{h\to 0} \frac{\sin h}{h} = 1$ ← Make sure these are the same.

4. Find $\lim_{x\to -4} \frac{\frac{1}{4}+\frac{1}{x}}{x+4}$. $= \lim_{x\to -4} \frac{\frac{1}{4}\cdot\frac{x}{x} + \frac{1}{x}\cdot\frac{4}{4}}{x+4}$

CHECK: $\frac{0}{0}$

$= \lim_{x\to -4} \frac{\frac{x+4}{4x}}{x+4} = \lim_{x\to -4} \frac{\cancel{x+4}}{4x} \cdot \frac{1}{\cancel{x+4}}$

$= \lim_{x\to -4} \frac{1}{4x} = \frac{1}{4(-4)} = \frac{-1}{16}$