Name:_____

MATH 150: QUIZ 15 (5.1)

1. Let $f(x) = \dfrac{2}{x-3}$, and let $g(x) = \dfrac{1}{x+4}$. Compute the domain of $f \circ g$.

2. Let $f(x) = 2x + 3$, and let $g(x) = x^3 - 1$. Compute $(f \circ g)(1)$.

3. Find functions f and g such that $(f \circ g)(x) = h(x)$, where $h(x) = \sqrt{x^2 + 2x - 7}$.

Solutions

1. Note that
$$\text{dom}(f \circ g) = \{x \in \text{dom}(g) \mid g(x) \in \text{dom}(f)\}.$$
We compute that $\text{dom}(g) = \{x \in \mathbb{R} \mid x \neq -4\}$. Since 3 is not in the domain of f, to get $\text{dom}(f \circ g)$ we have to additionally throw away points where $\dfrac{1}{x+4} = 3$. Solving, we get
$$\begin{aligned} \frac{1}{x+4} &= 3 \\ \frac{1-3(x+4)}{x+4} &= 0 \\ \frac{-3x-11}{x+4} &= 0 \\ x &= -\frac{11}{3}. \end{aligned}$$
It follows that $\text{dom}(f \circ g) = \left\{x \in \mathbb{R} \mid x \neq -4, -\dfrac{11}{3}\right\}$.
2. Note that $(f \circ g)(1) = f(g(1))$. We compute that $g(1) = 0$ and $f(0) = 3$, so $(f \circ g)(1) = 3$.
3. One possibility is $f(x) = \sqrt{x}$ and $g(x) = x^2 + 2x - 7$.