

HW 5 solution (Prob 4, 24)

Monday, March 20, 2023 9:20 PM

$$\textcircled{7} \quad f(x) = |x-1|$$

$$g(x) = 1-x^2$$

We have

$$f \circ g(-1) = f(g(-1))$$

Because $g(-1) = 1 - (-1)^2 = 1 - 1 = 0$, we get

$$f \circ g(-1) = f(0) = |0-1| = 1.$$

$\textcircled{24}$

$$f(x) = \frac{2x}{x^2-4}$$

$$f \circ f(x) = f(f(x)) = \frac{2f(x)}{f(x)^2-4} = \frac{2 \frac{2x}{x^2-4}}{\left(\frac{2x}{x^2-4}\right)^2-4}$$

$$= \frac{\frac{4x}{x^2-4}}{\frac{4x^2}{(x^2-4)^2}-4} = \frac{\frac{4x}{x^2-4}}{\frac{4x^2-4(x^2-4)^2}{(x^2-4)^2}}$$

$$= \frac{4x}{x^2-4} \frac{(x^2-4)^2}{-4x^4+36x^2-64} = \frac{4x(x^2-4)}{-4x^4+36x^2-64}$$

$$= \boxed{\frac{x(x^2-4)}{-x^4+9x^2-16}}$$