① given $f(x)=\sqrt{4-x^2}$ and $g(x)=\frac{x^2}{x+1}$,
find $\left(\frac{f}{g}\right)(x)$ and $\text{Dom}\frac{f}{g}$

② given $f(x)=x^4$ and $g(x)=\frac{x}{x+2}$,
find $(g-f)(x)$, $\left(\frac{f}{g}\right)(x)$, and $\text{Dom}\frac{f}{g}$

③ given $f(x)=\sqrt{x^2-9}$ on $(-\infty,-3]$,
find f^{-1} and graph f and f^{-1}

(10) $f(x) = \sqrt{x^2-4}$ $\quad g(x) = \frac{x^2}{x^2+1}$

a) $(f+g)(x) = \sqrt{x^2-4} + \frac{x^2}{x^2+1}$

b) $(f-g)(x) = \sqrt{x^2-4} - \frac{x^2}{x^2+1}$

c) $(fg)(x) = \left(\sqrt{x^2-4}\right)\left(\frac{x^2}{x^2+1}\right)$

$$= \frac{x^2\sqrt{x^2-4}}{x^2+1}$$

d) $\left(\frac{f}{g}\right)(x) = \dfrac{\sqrt{x^2-4}}{\frac{x^2}{x^2+1}}$

$$= \frac{\sqrt{x^2-4}}{\frac{x^2}{x^2+1}} \cdot \frac{x^2+1}{x^2+1}$$

$$= \frac{(x^2+1)\sqrt{x^2-4}}{x^2}$$

$\text{Dom } f = (-\infty, -2] \cup [2, \infty)$

$\text{Dom } g = \mathbb{R}$

$g(x) = 0$ for $x = 0$

so, $\text{Dom } \frac{f}{g} = (-\infty, -2] \cup [2, \infty) - \{0\}$

$= (-\infty, -2] \cup [2, \infty)$

(12) $f(x) = \frac{x}{x+1}$ and $g(x) = x^3$

a) $(f+g)(x) = \frac{x}{x+1} + x^3 = \frac{x}{x+1} + \frac{x^3(x+1)}{x+1}$

$= \frac{x^4 + x^3 + x}{x+1}$

b) $(f-g)(x) = \frac{x}{x+1} - x^3 = \frac{x}{x+1} - \frac{x^3(x+1)}{x+1}$

$= \frac{-x^4 - x^3 + x}{x+1}$

c) $(fg)(x) = \frac{x}{x+1}(x^3) = \frac{x^4}{x+1}$

d) $\left(\frac{f}{g}\right)(x) = \frac{\frac{x}{x+1}}{x^3} = \frac{x}{x+1} \cdot \frac{1}{x^3}$

$= \frac{1}{x+1} \cdot \frac{1}{x^2}$

$= \frac{1}{x^3 + x^2}$

$\text{Dom } f = \mathbb{R} - \{-1\}$

$\text{Dom } g = \mathbb{R}$

$g(x) = 0$ for $x = 0$

so, $\text{Dom } \frac{f}{g} = \mathbb{R} - \{-1, 0\}$