1 Given

$$
\begin{gathered}
f(x)=x^{2} \\
g(x)=x^{2}+4:
\end{gathered}
$$

a Find a simplified formula for $f \circ g$. (Show at least one intermediate step.)
I plug the formula for $g$ into the formula for $f$ :

$$
(f \circ g)(x)=f(g(x))=f\left(x^{2}+4\right)=\left(x^{2}+4\right)^{2}
$$

This is simplified as a factored expression, but you could also expand it: $(f \circ g)(x)=\left(x^{2}+4\right)^{2}=x^{4}+$ $8 x^{2}+16$.
$b$ Find a simplified formula for $g \circ f$. (Show at least one intermediate step.)
Now I plug the formula for $f$ into the formula for $g$ :

$$
(g \circ f)(x)=g(f(x))=g\left(x^{2}\right)=\left(x^{2}\right)^{2}+4=x^{4}+4
$$

2 Given

$$
\begin{gathered}
f(x)=\frac{3}{x-1} \\
g(x)=\frac{2}{x}
\end{gathered}
$$

find the the domain of $f \circ g$. (Show at least how you calculate every constant number that appears in your answer.)
First, $\operatorname{dom} g=\{x \mid x \neq 0\}$, since we're dividing by $x$ in $g(x)$. Next, since we're dividing by $x-1$ in $f(x)$, we're dividing by $g(x)-1$ in $(f \circ g)(x)$ :

$$
\begin{aligned}
g(x)-1 & \neq 0 \\
\frac{2}{x}-1 & \neq 0 \\
2-x & \neq 0 \\
-x & \neq-2 \\
x & \neq 2
\end{aligned}
$$

Therefore,

$$
\operatorname{dom}(f \circ g)=\{x \mid x \neq 0, x \neq 2\}
$$

