1.

a) Yes. This is definitely possible.

Example:

$f(x) = 3x^2$

$g(x) = x^4$

$$h(x) = \frac{f(x)}{g(x)}$$

$$= \frac{3x^2}{x^4}$$

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

It is possible to turn 2 functions that have no restrictions into 1 function with a restriction by combining them with the quotient method. In this case the restriction is $x \neq 0$.

b) This is possible as well.

Example:

$f(x) = \frac{x^3+1}{x}$ ← restriction $x \neq 0$

$g(x) = x^2$ ← no restriction

$$f(x) \cdot g(x) = \left(\frac{x^3+1}{\cancel{x}}\right)\left(x^{\cancel{2}}\right)^{x}$$

$$= (x^3+1)(x)$$

$$= x^4 + x$$

As you can see, when the functions are combined by multiplication, the restriction goes away.

2.

a) $h(x) = 4x^2 - 9$

i) sum

$f(x) = 2x^2 - 9$

$g(x) = 2x^2$

$\rightarrow h(x) = 4x^2 - 9$

ii) prod

$f(x) = (2x - 3)$

$g(x) = (2x + 3)$

$\rightarrow h(x) = 4x^2 - 9$

iii) quotient

$f(x) = (2x-3)^2 (2x+3)^3$

$g(x) = (2x-3)(2x+3)^2$

$h(x) = 4x^2 - 9$

iiii) comp

$f(x) = 4x$

$g(x) = x^2 - \frac{9}{4}$

$f[g(x)] = 4\left(x^2 - \frac{9}{4}\right)$

$h(x) = 4x^2 - 9$

b) $AROC = \frac{f(x_2) - f(x_1)}{x_2 - x_1}$ $(-2, 1)$

$= \frac{f(1) - f(-2)}{1-(-2)}$

$= \frac{(4(1)^2 - 9) - (4(-2)^2 - 9)}{3}$

$= \frac{(-5)(7)}{3}$

$= \frac{-35}{3}$

est. IROC:

$= \frac{f(x_2) - f(x_1)}{x_2 - x_1}$ $(0.9, 1.1)$

$= \frac{f(1.1) - f(0.9)}{1.1 - 0.9}$

$= \frac{(4(1.1)^2 - 9)(4(0.9)^2 - 9)}{0.2}$

$= \frac{(-4.16) - (-5.76)}{0.2}$

$= \frac{1.6}{0.2}$

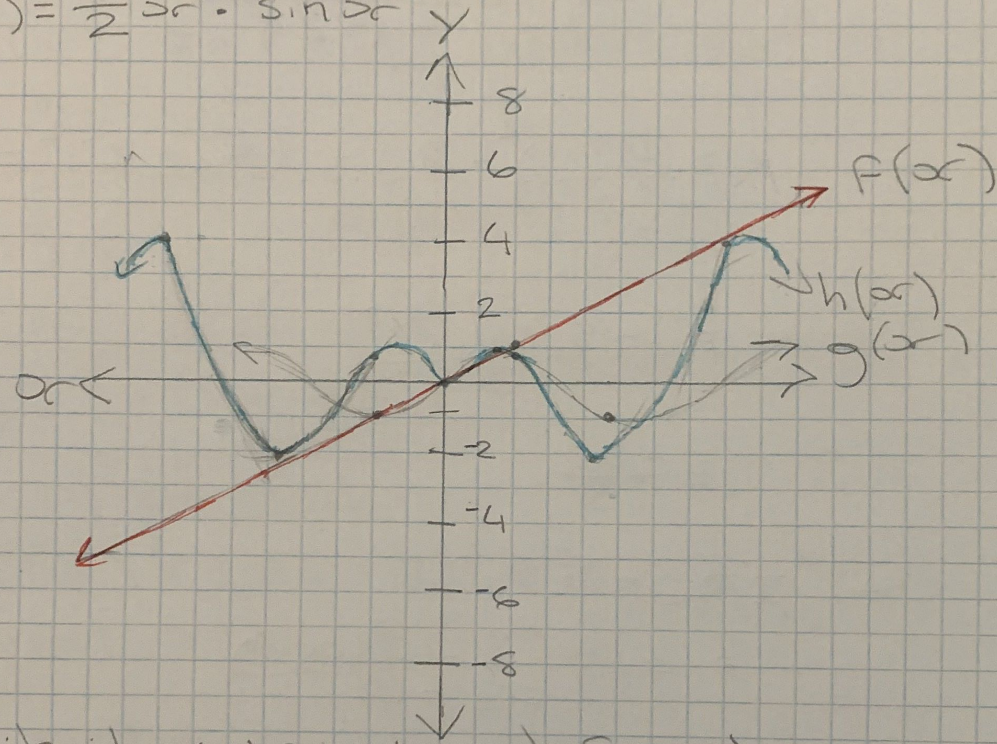
$= 8$

3.

$f(x) = \frac{1}{2}x$

$g(x) = \sin x$

$h(x) = \frac{1}{2}x \cdot \sin x$



Similarities to original function:

- amplitude increases with max value of $y = \frac{1}{2}x$
- function ocillates like sin (sinusodial behavior)
- period is the same as sin (except at origin)

Differences:

- goes through the origin similar to how cos does
- reflected on the y axis