WA 6 sols 23/23

1] ⓐ $(L \circ N)(a) = \dfrac{2N(a)}{N(a)+2}$

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$= \boxed{\dfrac{2(a-1)^3}{(a-1)^3+2}}$ +3

ⓑ $(N \circ L)(t) = (L(t)-1)^3$

$= \boxed{\left(\dfrac{2t}{t+2}-1\right)^3}$ +3.

They are very different! +1

ⓒ $(L \circ L)(-3) = ?$

$L(-3) = \dfrac{2(-3)}{-3+2} = \dfrac{-6}{-1} = 6$

$(L \circ L)(-3) = L(6) = \dfrac{2 \cdot 6}{6+2} = \dfrac{12}{8} = \boxed{\dfrac{3}{2}}$ +2

2] ⓐ $(H \circ M)(3) = H(1) = \underline{0}$ +1

4/4 ⓑ $(H \circ H)(0) = H(3) = \underline{0}$ +1

ⓒ $(M \circ H)(-2) = M(0) = \underline{3}$ +1

ⓓ $(M \circ M)(1) = M(0) = \underline{3}$ +1

3] (a) $h(x) = (1+3x)^2$

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$f(x) = \underline{x^2} + 1$ — other possibilities ok, as long as correct

$g(x) = \underline{1+3x}$, +1

so $(f \circ g)(x) = (g(x))^2 = (1+3x)^2 = h(x)$. ✓

(b) $g(x) = e^{-3x}$.

$f(x) = \underline{e^x}$ +1

$g(x) = \underline{-3x}$. +1

Then $(f \circ g)(x) = e^{g(x)} = e^{-3x} = g(x)$ ✓

(c) $r(x) = e^{x^2}$

$f(x) = \underline{e^x}$ +1

$g(x) = \underline{x^2}$ +1

Then $(f \circ g)(x) = e^{g(x)} = e^{x^2} = r(x)$ ✓

4] ⓐ $f(x) = \frac{1}{x}$ $\quad g(t) = t+4.$

8/8 $(f \circ g)(t) = \frac{1}{g(t)} = \boxed{\frac{1}{t+4}}$. +2

dom(g) = all real numbers.

So, $\text{dom}(f \circ g) = \{t \mid t+4 \neq 0\} = \boxed{(-\infty, -4) \cup (-4, \infty)}$. +2

ⓑ $f(x) = \sqrt{2x+1}$, $g(t) = 3 - t$

$$(f \circ g)(t) = \sqrt{2g(t)+1}$$
$$= \sqrt{2(3-t)+1}$$
$$= \sqrt{6-2t+1}$$
$$= \boxed{\sqrt{7-2t}}$$ +2

Again, dom(g) = all real numbers,

so $\text{dom}(f \circ g) = \{t \mid 7-2t \geq 0\} = \boxed{(-\infty, \frac{7}{2}]}$. +2

$7 \geq 2t$

$\frac{7}{2} \geq t$