WA 7 sols

36/36 + EC possible

1 ⓐ $Q = f(t) = 3e^{-2t}$

12/12

$$Q = 3e^{-2t}$$

$$\frac{Q}{3} = e^{-2t}$$

$$\ln(Q/3) = -2t$$

$$-\frac{1}{2}\ln(Q/3) = t$$

work +1

So, $f^{[-1]}(Q) = -\frac{1}{2}\ln(Q/3)$.

+3

ⓑ $Q = g(t) = 6 + \log_2(t-1)$

$$Q = 6 + \log_2(t-1)$$

$$Q - 6 = \log_2(t-1)$$

$$2^{Q-6} = t - 1$$

$$t = 2^{Q-6} + 1$$

work +1

So, $g^{[-1]}(Q) = 2^{Q-6} + 1$

+3

(c) $Q = h(t) = 11 + t^3$

$Q = 11 + t^3$

$Q - 11 = t^3$

$t = (Q-11)^{1/3}$

Work +1

so $h^{[-1]}(Q) = (Q-11)^{1/3}$

+3

2] $D = \frac{M}{V} = \frac{0.2}{V}$ +1

4/4 This is one-to-one since we can always solve +2 for a unique input given an output D:

$D = \frac{0.2}{V} = f(V)$

$V = \frac{0.2}{D}$

$f^{[-1]}(D) = \frac{0.2}{D}$

+1

3] 15/15

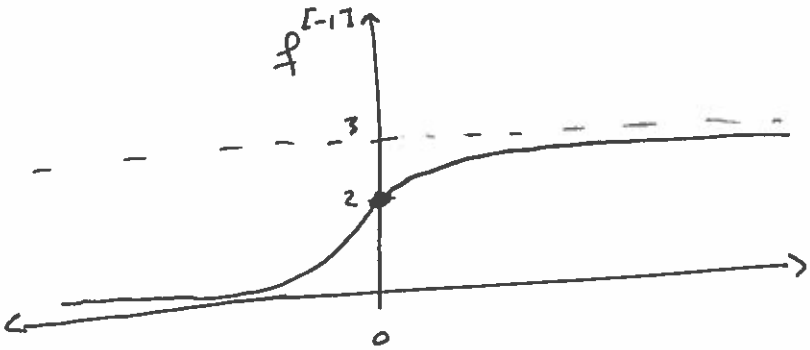
(a) $\text{dom}(f^{[-1]}) = \text{Range}(f) = \underline{(-\infty, \infty)}$ +1

(b) $\text{dom}(g^{[-1]}) = \text{Range}(g) = \underline{(-2, 2]}$ +1

(c) $\text{Image}(f^{[-1]}) = \text{domain}(f) = \underline{(0, 3)}$ +1

(d) $\text{Image}(g^{[-1]}) = \text{dom}(g) = \underline{[-1, \infty)}$ +1

(e) Knew $f(2) = 0$, so $2 = f^{[-1]}(0)$.



any graph: +1

Must satisfy these criteria

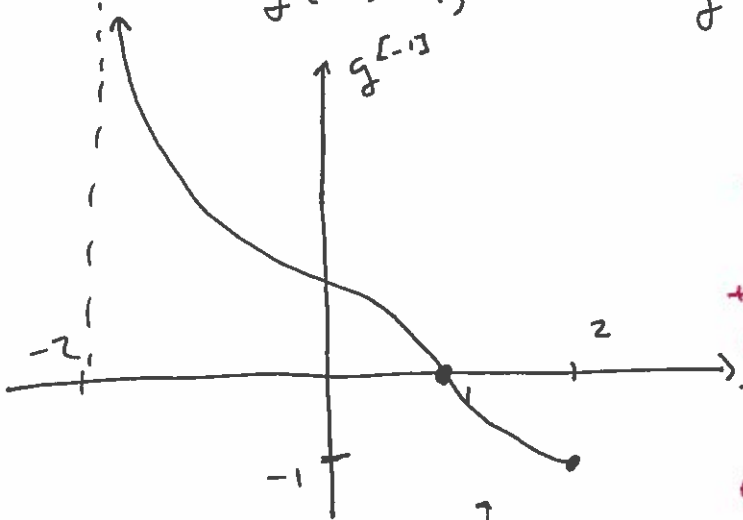
+1 * all real #'s in dom

+1 * Must contain (0, 2)

+1 * Stays between $y = 0$ and $y = 3$.

+1 * Must pass horiz. line test.

Knew: $g(0) = 1$, so $g^{[-1]}(1) = 0$.



possibility:

any graph: +1

+1 * need (1, 0) on graph

+1 * pass horizontal line test

+1 * need an output at $t = -2$

+1 * graph must only go from $t = -2$ to $t = 2$

+1 * Range needs to be $[-1, \infty)$.

4] 5/5

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

$$\frac{1}{y} = 2 - t$$

$$t = 2 - \frac{1}{y}$$

$$\Rightarrow \quad f^{[-1]}(y) = 2 - \frac{1}{y}.$$

+2

on the other hand,

$$f(t)^{-1} = \frac{1}{f(t)} = \frac{1}{1/(2-t)} = 2 - t,$$

+2

very different!

+1

5] Give (+2) points for each example given. Need proof (a computation) showing their functions are self-inverse.

Common examples: $f(t) = t$

: $g(t) = \frac{1}{t}$

$h(t) = -t$

$r(t) = -\frac{1}{t}$