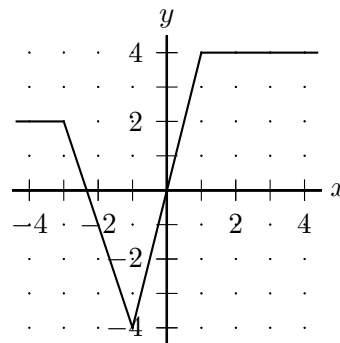


2. [7 points] Invertible functions f and g and a function h are described by the table, formula, and graph below. Use this information to answer the questions that follow.

| | | | | | | | | | |
|--------|----|----|----|----|----|---|----|---|----|
| x | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
| $f(x)$ | 3 | -2 | 1 | 4 | -3 | 0 | -4 | 2 | -1 |

$$g(t) = \begin{cases} 4 + x & \text{if } x < 3 \\ 2^x & \text{if } x \geq 3 \end{cases}$$



Graph of $y = h(x)$

Evaluate each of the following quantities, if possible.

If the specified quantity is undefined, write "UNDEFINED".

You do not have to show your work. However, any work you show may be worth partial credit.

a. [1 point] $f(0)h(-4)$

Solution: $f(0) = -3$ and $h(-4) = 2$.
So, $f(0)h(-4) = (-3)(2) = -6$.

Answer: -6

b. [1 point] $3f(g(-2))$

Solution: $g(-2) = 4 + (-2) = 2$. So
 $3f(g(-2)) = 3f(2) = 3(-4) = -12$.

Answer: -12

c. [1 point] $f^{-1}(h(1) - 2)$

Solution:
 $h(1) = 4$ so $h(1) - 2 = 4 - 2 = 2$.
Hence $f^{-1}(h(1) - 2) = f^{-1}(2) = 3$.

Answer: 3

d. [1 point] $g^{-1}(4)$

Solution: g is invertible and piecewise-defined, so we must figure out which part of the piecewise formula has an output of 4. 2^x is defined for $x \geq 3$, so this piece gives outputs in the interval $[8, \infty)$. So, we must solve

$$4 + x = 4.$$

The solution is $x = 0$. So $g^{-1}(4) = 0$.

Answer: 0

e. [1 point] $g(g(-1))$

Solution: $g(-1) = 4 + (-1) = 3$. So
 $g(g(-1)) = g(3) = 2^3 = 8$.

Answer: 8

f. [1 point] $k(-1)$ if $k(x) = \frac{1}{3}h(3x)$

Solution:
 $k(-1) = \frac{1}{3}h(3(-1)) = \frac{1}{3}h(-3) = \frac{1}{3}(2) = \frac{2}{3}$

Answer: 2/3

- g. [1 point] Find the average rate of change of $h(x)$ between $x = -1$ and $x = 4$.

Solution: This average rate of change is given by

$$\frac{h(4) - h(-1)}{4 - (-1)} = \frac{4 - (-4)}{5} = \frac{8}{5}.$$

Answer: 8/5