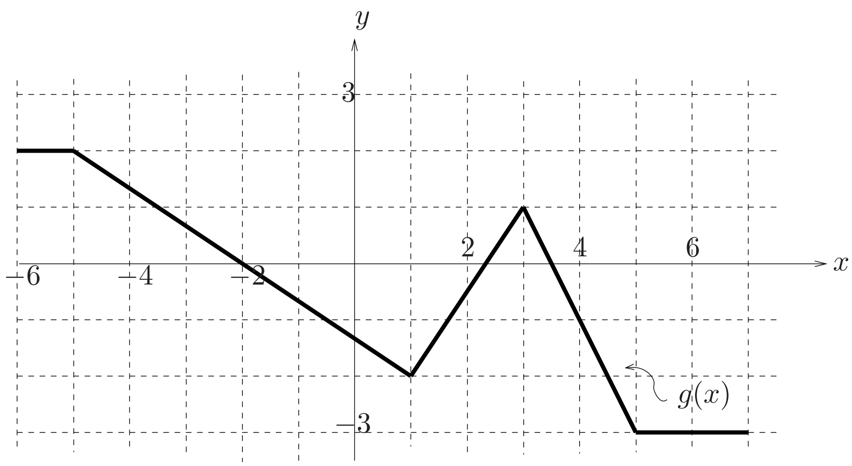
3. (16 points) Some values for a differentiable function f are given in the table below, and the graph of $y = g(x)$ on the interval [-6,7] is given in the figure below. Do not assume any information about f or g other than what is given.



x	-4	-3	-2	-1	0	1	2	3	4
$f(x)$	0.5	4	7.5	10	9	5	0	3	9
$f'(x)$	3	4	3	2	-1	-7	-2	4	6

Use the table and the graph to find the following, if possible. If any information is missing, explain *clearly* what is missing. Show your work.

(a) Find $h'(4)$ if $h(x) = g(x)f(x)$.

We know $h'(x) = g'(x)f(x) + g(x)f'(x)$. So, $h'(4) = g'(4)f(4) + g(4)f'(4)$. From the table, we can see that $f(4) = 9$ and $f'(4) = 6$. From the graph of g, we can see that $g(4) = -1$. Computing the slope of the line at $g = 4$ gives $g'(4) = -2$. Plugging these values into the above formula for $h'(4)$ gives that $h'(4) = (-2)(9) + (-1)(6) = -24$.

(b) Find $h'(4)$ if $h(x) = g(f(x))$.

We know $h'(x) = g'(f(x))f'(x)$. So, $h'(4) = g'(f(4))f'(4)$. From the table, we can see that $f(4) = 9$ and $f'(4) = 6$. However, we can not determine $g'(9)$ from the given graph of g. So there is MISSING INFORMATION–$g'(9)$.

(c) Find $h'(-2)$ if $h(x) = 4\sin(g(x)) - \pi$.

We know that $h'(x) = 4\cos(g(x))g'(x)$. So, $h'(-2) = 4\cos(g(-2))g'(-2)$. From the graph of g, $g(-2) = 0$ and $g'(-2) = \frac{-2}{3}$ (compute the slope of the line through $x = -2$). Plugging in these values into the above equation gives $h'(-2) = 4(-2/3) = -8/3$.

(d) Find $h'(1)$ if $h(x) = (g(x))^2$.

We know that $h'(x) = 2g(x)g'(x)$. So, $h'(1) = 2g(1)g'(1)$. Notice though that on the graph of g, there is a sharp point at $x = 1$. This means that $g'(1)$ is undefined, and thus finding $h'(1)$ is NOT POSSIBLE.