3. [12 points] Consider the functions $F(x)$ and $G(x)$ given below. Assume the function $G(x)$ is invertible.

<table>
<thead>
<tr>
<th>$x$</th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>$G(x)$</td>
<td>-3</td>
<td>-1</td>
<td>0.3</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

Compute the following quantities. Write UNDEFINED if the quantity can’t be computed with the information provided.

a. [2 points] $G(1)=$__________ $G^{-1}(1)=$__________

Solution: $G(1) = 0.3$ $G^{-1}(1) = 2$

b. [2 points] $F(G(2))=$__________ $F(F(-3))=$__________

Solution: $F(G(2)) = F(1) = 3$ $F(F(-3)) = F(-2) = -1$.

c. [3 points] Solve the following equations:

$F(a) = 0$ $a=$__________ $G(b) = -3$ $b=$__________.

Solution: $F(a) = 0$ $a = -1, 0$ $G(b) = -3$ $b = -1$.

d. [2 points] If $G(F(x)) = 2$, then $x=$__________.

Solution: If $G(F(x)) = 2$, then $F(x) = 3$ and $x = 1$.

e. [3 points] Let $R(x)$ be defined as follows

$$R(x) = \begin{cases} 4x^2 & x \leq 1 \\ 1 + 2x & x > 1 \end{cases}$$

For $h > 0$, find an expression for $R(1+h) - R(1)$ only in terms of $h$. No need to simplify.

$R(1+h) - R(1)=$__________

Solution: $R(1+h) - R(1) = 1 + 2(1 + h) - 4$. 