3. [12 points] A heater is turned on in a cold room. Let \( n = f(T) \) be the number of hours it takes for the heater to warm the room to a temperature of \( T \) degrees Fahrenheit (\( ^\circ F \)). A table of values of this function is given below.

<table>
<thead>
<tr>
<th>( T )</th>
<th>61</th>
<th>64</th>
<th>66</th>
<th>67</th>
<th>68</th>
</tr>
</thead>
<tbody>
<tr>
<td>( n = f(T) )</td>
<td>0.5</td>
<td>1.3</td>
<td>2.3</td>
<td>3.3</td>
<td>7</td>
</tr>
</tbody>
</table>

The cost, \( C \), in dollars, to run the heater for \( n \) hours is given by the formula

\[
C = g(n) = 0.25 + 0.4n.
\]

Both \( f \) and \( g \) are invertible functions.

a. [2 points] Compute the quantities \( f^{-1}(0.5) \) and \( g(f(68)) \).

Answer: \( f^{-1}(0.5) = \) _______ and \( g(f(68)) = \) _______

b. [2 points] Find a formula for \( g^{-1} \) in terms of \( C \).

Answer: \( g^{-1}(C) = \) __________________________

c. [3 points] For each part below, write a phrase or sentence giving a practical interpretation of the given expression or equation, or explain why it doesn’t make sense in this context.

i. \( g(1) = 0.65 \)

ii. \( f(g(3)) \)

(Problem continues on the next page.)
A heater is turned on in a cold room. Let $n = f(T)$ be the number of hours it takes for the heater to warm the room to a temperature of $T$ degrees Fahrenheit ($\circ F$). A table of values of this function is given below.

<table>
<thead>
<tr>
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<th>61</th>
<th>64</th>
<th>66</th>
<th>67</th>
<th>68</th>
</tr>
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<tbody>
<tr>
<td>$n = f(T)$</td>
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</table>

The cost, $C$, in dollars, to run the heater for $n$ hours is given by the formula

$$C = g(n) = 0.25 + 0.4n.$$

Both $f$ and $g$ are invertible functions.

d. [3 points] For each item below, write an expression or equation, possibly involving the functions $f$, $g$, and/or their inverses, that represents the given statement.

i. It takes an hour to heat the room to 63 $\circ F$.

ii. the temperature of the room when the heating costs have reached $1$

e. [2 points] Circle the numeral of the one description below that is best supported by the evidence in this problem. Clearly show your work in the space below.

i. Each $\circ F$ increase in temperature takes the same amount of time.

ii. As the room warms up, it takes an increasing amount of time to heat the room to each additional $\circ F$ in temperature.

iii. It takes less and less time for the heater to heat the room to each additional $\circ F$ in temperature.

Work: