3. [11 points] At 8:00 am, a water pump is turned on and water starts filling a swimming pool. Consider the following functions:

    a) Let $F(t)$ be the number of gallons of water the pump has put into the swimming pool t minutes after 8 am.

    b) Let $G(x)$ be the depth of the water in the swimming pool, in inches, when it contains x gallons of water.

Assume that all the functions defined above are invertible.

    a. [6 points] Give a practical interpretation to the following mathematical expressions:

Solution:

        i) $G^{-1}(30)$:

            The number of gallons in the swimming pool if the depth of the water is 30 inches.

        ii) $G(F(30))$:

            It is the depth of the water, in inches, at 8:30 am.

    b. [5 points]

        i) Let D be the number of gallons of water the pump puts into the swimming pool between 8:15 am and 8:30 am. Find a mathematical expression for the constant D in terms of any the functions defined above.

Solution: $D = F(30) - F(15)$

        ii) Let $H(m)$ be the amount of water, in gallons, put by the water pump in the swimming pool **m minutes after 9:00 am**. Find a formula for $H(m)$ in terms of any of the functions defined above.

Solution: $H(m) = F(m + 60)$