1. [11 points] Consider the following functions described below:
   
   a. [7 points] Water is added into an empty tank at a rate of 9 gallons per minute until it is full. Once the tank is full, the water is shut off. The tank is 5 ft tall and has capacity to store 180 gallons of water. During the time the water is entering the tank, let \( H(t) \) be the depth of water (in ft) in the tank \( t \) minutes after it starts to be filled with water.

   i) [1 points] How long does it take for the tank to be filled? 

   \[ \text{Solution:} \quad \frac{180}{9} = 20 \text{ minutes.} \]

   ii) [4 points] Given that the function \( H(t) \) is only defined during the time that water is being added into the tank, find the domain and range of the function \( H(t) \)? Write your answers in interval notation or with inequalities.

   \[ \text{Solution:} \quad \text{Domain: } [0, 20] \text{ or } 0 \leq t \leq 20, \quad \text{Range: } [0, 5] \text{ or } 0 \leq H(t) \leq 5. \]

   iii) [2 points] Is the function \( H(t) \) increasing, decreasing or neither, during the time that water is being poured into the tank? Circle your answer.

   \[ \text{Solution:} \quad \text{INCREASING} \quad \text{Decreasing} \quad \text{Neither} \]

   b. [4 points] As part of an experiment, bacteria is deposited in a piece of raw meat. At first, the amount of bacteria grows slowly, but its rate of growth continues to increase. Let \( B(t) \) be the amount of bacteria at time \( t \) (in hours). Which of the listed attributes could be true for the function \( B(t) \) on its entire domain? Circle your answer.

   \[ \text{Solution:} \quad \text{INCREASING} \quad \text{Decreasing} \quad \text{Neither increasing or decreasing} \]

   \[ \text{CONCAVE UP} \quad \text{Concave down} \quad \text{Neither concave up or concave down} \]