2. [9 points] Note: *"Closed form" here means that the expression should* NOT *include sigma notation or ellipses (. . .) and should* NOT *be recursive.*

Michel is studying how the mass of a certain collection of bacterial cells behaves in the presence of a parasite. He notices that from noon to midnight of each day, the parasite eats 60% of the mass of the bacterial cells. Then the parasite sleeps until noon the next day. While the parasite sleeps, the remaining 40% of the collection of bacterial cells doubles in mass.

At noon on the first day, the mass of the collection of bacterial cells is 100 grams.

a. [3 points] Let X_n be the mass, in grams, of bacterial cells present at noon on day n. Note that $X_1 = 100$. Calculate X_2 and X_3, and find a closed form expression for X_n.

Answer: $X_2 =$ _____ and $X_3 =$ _____

Answer: $X_n =$ _____

b. [4 points] Let K_n be the <u>total</u> mass, in grams, of bacterial cells that the parasite has consumed in the first n days. For example, on day 1 the parasite consumes 60% of 100 grams, which is 60 grams, so $K_1 = 60$. Calculate K_2 and K_3, and find a closed form expression for K_n.

Answer: $K_2 =$ _____ and $K_3 =$ _____

Answer: $K_n =$ _____

c. [2 points] If this continued forever, how many grams of bacterial cells would the parasite eventually eat?

Answer: Mass = _____