

7. [13 points] After testing different ingredients in their parents' garages, Imran and Nicole have recently opened new organic peanut butter companies.
- a. [3 points] Two months after opening, Imran's company, Chunky Munky, has produced a total of 256 pounds of peanut butter. Imran thinks Chunky Munky produces peanut butter at a constant rate of 690 pounds every 6 months. Assuming Imran is correct, write a formula for $P(m)$, the total amount of peanut butter, in pounds, that Chunky Munky will have produced m months after opening.

Answer: $P(m) =$ _____

- b. [4 points] Nicole's company, Lots O' Crunch, has produced a total of 182 pounds of peanut butter two months after opening and a total 454 pounds of peanut butter five months after opening. Nicole thinks that Lots O' Crunch produces peanut butter exponentially. Assuming Nicole is correct, write a formula for $Q(x)$, the total amount of peanut butter, in pounds, Lots O' Crunch will have produced x months after opening. *Decimal approximations must be rounded to at least three decimal places.*

Answer: $Q(x) =$ _____

Ann Arbor's leading local peanut butter company is Sticky PB Company. The total amount of peanut butter produced by Sticky PB Company m months after Chunky Munky opens is given by

$$S(m) = 1500e^{0.32m}.$$

- c. [2 points] By what percent is Sticky PB Company's production growing every month? Round your answer to two decimal places.

Answer: _____%

- d. [4 points] After a lot of analysis, Imran determines that Chunky Munky's total peanut butter production m months after opening is best modeled by the exponential function

$$C(m) = 100(1.6)^m.$$

According to this model, when will Chunky Munky and Sticky PB Company have produced the same amount of peanut butter? *Show all your work and leave your answer in exact form.*

Answer: _____ months