

2. [11 points] *For full credit on this problem, you must show your work carefully. Unless specified otherwise, answers should either be in exact form or be rounded accurately to at least three decimal places.*

The population of Linearville grew from 9,000 in January 2003 to 14,000 in January 2005.

- a. [2 points] Find the average rate of change of the population of Linearville between January 2003 and January 2005. (*Include units.*)

Answer: _____

- b. [3 points] The population of Linearville has been growing linearly since January 2000. Find a formula for $L(t)$, the population of Linearville t years after January 2000.

Answer: $L(t) =$ _____

The neighboring town of Exponential Corner has also been growing. Its population was 100 in January 2003 and had risen to 150 by January 2005.

- c. [4 points] Suppose that since January 2000, the population of Exponential Corner has been growing exponentially. Find a formula for $E(t)$, the population of Exponential Corner t years after January 2000.

Answer: $E(t) =$ _____

- d. [2 points] Assuming the populations continue to grow as described above, will the population of Exponential Corner ever catch up to the population of Linearville?
If so, when will this happen? (*Round to the nearest year.*)
If not, explain how you know this.