

YOUR NAME: _____

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Read each problem **very carefully** before starting to solve it. Each problem is worth 5 points. It is necessary to **show neatly all your work**. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. Suppose that the population in a certain city is given by $P(t) = 800,000e^{-0.02t}$, where t is the number of years since 2003.

(a) Estimate the population in the city in 2010.

(b) What is the average rate of change of the population between 2010 and 2020?

(c) In which year is the population projected to fall below the half million mark?

2. Find the values of the following logarithms **by hand** and provide the corresponding exponential expressions:

$$\log_3 81 =$$

$$\log_2 \frac{1}{8} =$$

$$\log_8 2 =$$