1. A population of 265 swans are introduced to Circle Lake. The population’s birth rate is 0.341 swans/year, and the death rate is 0.296 swans/year. What is the rate of population growth? Round to the nearest thousandth place.

2. There are 190 grey treefrogs in a swamp. If \( r = -0.093 \) frogs/year, predict the population size next year. Round to the nearest whole number.

3. A population of 1,492 Baltimore Orioles is introduced to an area of Nerstrand woods. Over the next year, the Orioles show a death rate of 0.395 while the population drops to 1,134. What’s the birth rate for this population? Round to the nearest thousandth place.
4. 780 turkeys live in Merriam township, which is 92 acres in size. The birth rate is 0.472 turkeys/year. The death rate is 0.331 turkeys/year.

   a. What is the population density?

   b. What is $dN/dt$?

   c. Predict $N$ after one year, assuming $dN/dt$ stays constant.

5. One dandelion plant can produce many seeds, leading to a high growth rate for dandelion populations. If a population of dandelions is currently 40 individuals, and $r_{\text{max}} = 80$ dandelions/month, predict $dN/dt$ if these dandelions would grow exponentially. Round to the nearest whole number.

6. Imagine the dandelions mentioned in #5 cannot grow exponentially, due to lack of space. The carrying capacity for their patch of lawn is 70 dandelions. What is their $dN/dt$ in this logistic growth situation? Round to the nearest whole number.
**POPULATION MATH PRACTICE KEY:**

1) \( r \) is increasing. \( r=0.045 \)

2) 172 frogs 3) \( b=0.155 \)

4a) 8.5 turkeys/acre 4b) 110 turkeys/year 4c) 890 turkeys

5) 3200 dandelions

6) 1371 dandelions 3.

\[
dN/dt = (b-d)N
\]

\[
(1134-1492)/1 = (b-0.395) 1492
\]

so \( b=0.155 \).

5. One dandelion plant can produce many seeds, leading to a high growth rate for dandelion populations. If a population of dandelions is currently 40 individuals, and \( r_{\text{max}}=80 \) dandelions/month, predict \( dN/dt \) if these dandelions would grow exponentially.

Equation to use, exponential growth: \( dN/dt = r_{\text{max}} N \)

\( dN/dt = 80 \times 40 = 3200 \)

6. Imagine the dandelions mentioned in #5 cannot grow exponentially, due to lack of space. The carrying capacity for their patch of lawn is 70 dandelions. What is their \( dN/dt \) in this logistic growth situation?

Equation to use, logistic growth: \( dN/dt = r_{\text{max}} N \left( K-N/K \right) \)

\( dN/dt = 80 \times 40 \left( 70-40/70 \right) \)

\( dN/dt = 3200 \left( 30/70 \right) \)

\( dN/dt = 1371 \)