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, and is it increasing or decreasing?

$\frac{dN}{dt} = 0.045$ ↑

2. There are 190 grey treefrogs in a swamp. If r= -0.093 frogs/ year, predict the population size next year.

$172 = 190 - [0.093 \cdot 190]$

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? Is this proving to be a suitable habitat?

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? 8.48 turkeys/acre

b. What is dN/dt? 0.141

c. Predict N after one year, assuming dN/dt stays constant. 890 turkeys

18. 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 $r_{max} = 0.2$ dandelions/month per capita, predict how many dandelions would be in this population after 4 months. Round to the nearest whole number.

19. Imagine the dandelion population of 40 (in ~~#18~~) cannot continue to 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 tenth.

3. $\frac{dN}{dt} = B - D$

$-0.24 = B - (+0.395)$

$+0.395 \quad +0.395$

$0.155 = B$

"$\frac{\text{new} - \text{old}}{\text{old}}$"

$\frac{1134 - 1492}{1492}$

18.

0	$40 \cdot 0.2 = 8$
1	$48 \cdot 0.2 = 9.6$
2	$57.6 \cdot 0.2 = 11.5$
3	$69.1 \cdot 0.2 = 13.8$
4	82.9

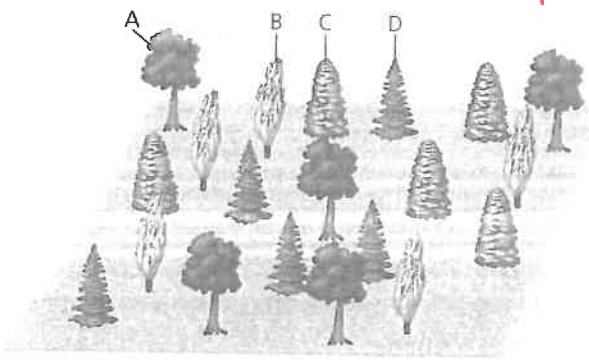
19. $\frac{dN}{dt} = r_{max} \cdot N\left(\frac{k-N}{k}\right)$

from #18... $= 0.2 \cdot 40\left(\frac{70-40}{70}\right)$

$= 8\left(\frac{70-40}{70}\right)$

$\frac{dN}{dt} = 3.4$

2. Use the Simpson's diversity index to determine which of the communities pictured below is the most diverse.

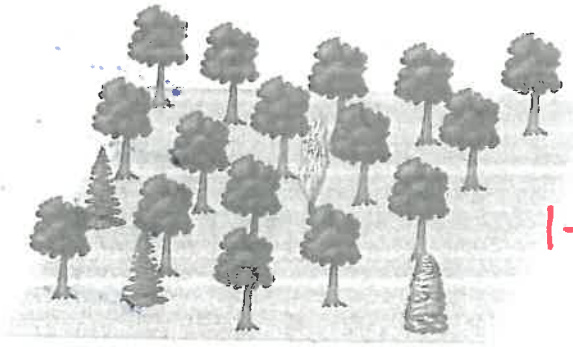


Community 1
A: 25% B: 25% C: 25% D: 25%

$1-\left[\left(\frac{25}{100}\right)^2+\left(\frac{25}{100}\right)^2+\left(\frac{25}{100}\right)^2+\left(\frac{25}{100}\right)^2\right]$

$1-[0.25]$

0.75



Community 2
A: 80% B: 5% C: 5% D: 10%

$1-\left[\left(\frac{80}{100}\right)^2+\left(\frac{5}{100}\right)^2+\left(\frac{5}{100}\right)^2+\left(\frac{10}{100}\right)^2\right]$

$1-[0.655]$

0.345

▲ **Figure 54.10 Which forest is more diverse?** Ecologists would say that community 1 has greater species diversity, a measure that includes both species richness and relative abundance.