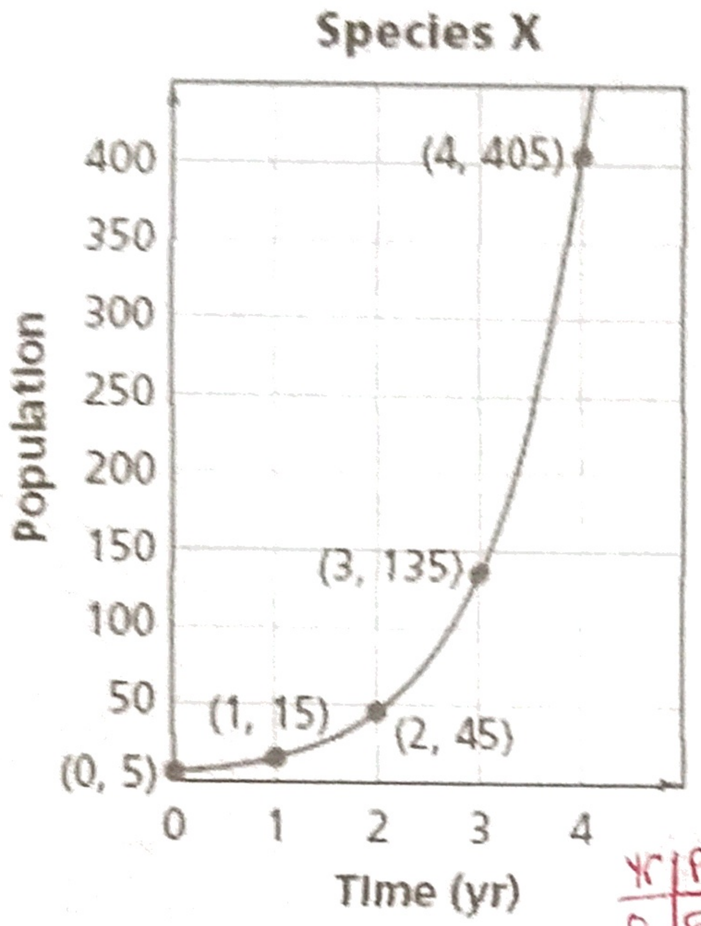
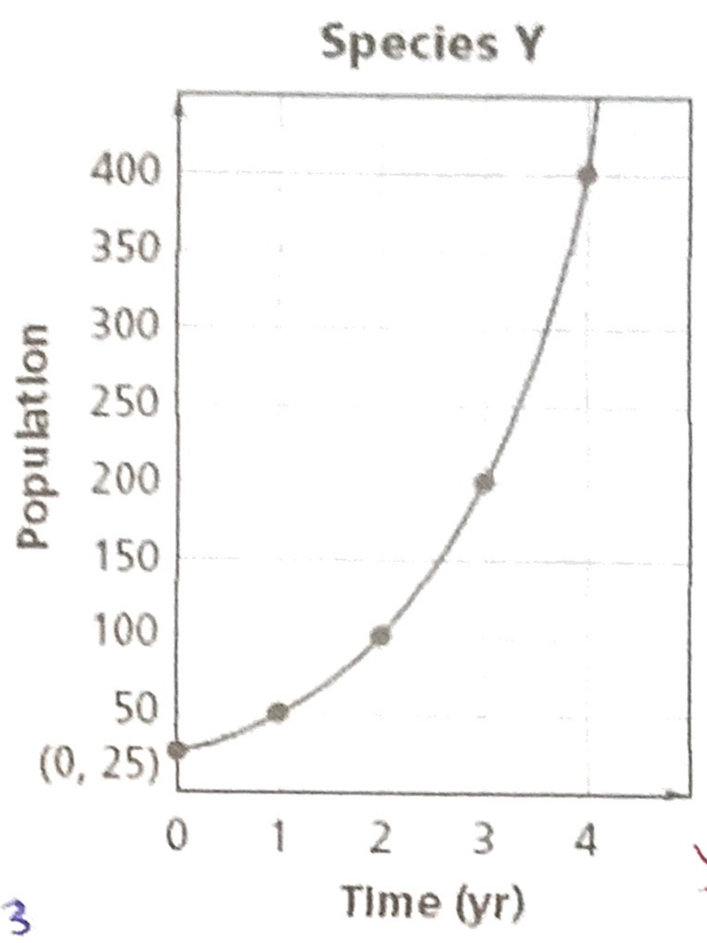
Name: _____ **Date:** _____ **HW # 85 Using Exp Equations**

The following graphs show the population growth for two species.





Yr	Pop
0	5 · 3
1	15 · 3
2	45

Yr	Pop
0	25 · 2
1	50 · 2
2	100

1. Find the growth factor for each species. Which species is growing faster? Explain.

Species X factor is 3. Species Y factor is 2.
Species X is growing faster b/c 3 > 2.

2. Find the initial population for each species. Which species started with a greater population? Explain.

Species x initially had 5 in the population & Species y had 25.
Species Y started with a greater pop. b/c 25 > 5.

3. Write an equation for each species.

P: population
y: time in yrs.

Species X $P(y) = 5 \cdot 3^y$ Species Y $P(y) = 25 \cdot 2^y$

4. For which species is (5, 1215) a solution? Explain.

Spec. X	
y	P
4	405 · 3
5	1215

Spec Y	
y	P
4	400 · 2
5	800

A population of mice has a growth factor of 3. After 1 month, there are 36 mice. After 2 months, there are 108 mice.

Mon	Mice
0	12
1	36 · 3
2	108

$\frac{108}{36} = 3$

5. How many mice were initially in the population (at 0 months)?

12 mice

6. Write an equation for the number of mice in the population after any number of months.

$f(x) = 12 \cdot 3^x$

7. When will the mice population reach 1,000,000

use desmos table

after 10 yrs but before 11 yrs.

x	y
10	708588 (1 060 660)
11	2.125764×10^6

Many 19th and 20th century settlements were left to rot after natural disasters, wars or economic depressions forced their residents to flee. These "ghost towns" stand as eerie monuments to bygone eras, and some have even found a second life as tourist attractions and movie sets. One such town is Hashima Island, Japan which is 16 acres in size and was home to a coalmine. In 1950 it had a population of 5,200 people. The mine closed shortly after 1950 and the people started to leave. The decay of the town can be modeled by the equation $P(y) = 5200 \cdot \left(\frac{4}{5}\right)^y$ where P is the Population and y is the number of years since 1950.

8. What was the population in 1960?

$\frac{-1950}{10}$ 10 years since 1950

$P(10) = 5200\left(\frac{4}{5}\right)^{10}$

$P \approx 558$ people

9. When was the population less than 100?

Use desmos table

x	y
17	117.09
→ 18	93.67

Almost 18 yrs. after 1950, so around 1968.

Each year the local country club sponsors a tennis tournament. Play starts with 128 participants. During each round, half of the players are eliminated.

10. Write an equation for the number of participants after each round of play.

$f(x) = 128\left(\frac{1}{2}\right)^x$

11. How many participants are left after 3 rounds?

$f(3) = 128\left(\frac{1}{2}\right)^3$

$= 128\left(\frac{1}{8}\right)$

16

12. How many rounds does it take to get a single winner?

7

x	y
0	128
1	64
2	32
3	16
4	8
5	4
6	2
7	1