c. In what year will the population of Mexico be double what it was in 1980? Write the equation you would solve and explain/show briefly how you solved:

$67.38 \times 2 = 134.74$

$134.74 = 67.38(1.026)^t$

$2 = (1.026)^t$

$t = 26.999$

$\approx$ end of 2006

d. If the ***growth rate*** of the Mexican population were increased by one percent, what would be the projected population of Mexico this year? How does that compare with your original projection for this year? Show how the equation changes and how you calculate the answer

original growth factor $1.026 \rightarrow .26\% + 1\% = 1.26\% \rightarrow 1.126$ ← new growth factor

$f(35) = 67.38(1.126)^{35}$

$f(35) = 4289.184 > 165.458$

this year with 1.26% growth rate

this year .26% growth rate

4123.726 million more

3) In 2012, the population of snipe in Green Bay was 210. This year, the population was 300 snipe.

a) Define the variable t to be the number of years since 2012. Assuming that the snipe population grows exponentially, show how to determine an equation that will show the snipe population as a function of t years.

(t) year since 2012	snipe
-2	210
-1	
0	
1	
2	
3	300

$f(t) = a \cdot b^t$

$f(t) = 210 \cdot b^3 = 300$

$\sqrt{b^3} = \sqrt{\frac{300}{210}}$

$b = 1.126$

$f(t) = 210 \cdot 1.126^t$

b) What is the growth rate governing the snipe population? 1.26%

c) If this trend continues, what will be the snipe population in 2020? Show how you use your equation to answer this question.

2020 → 8 years $f(8) = 210 \cdot 1.126^8$

$f(8) = 542.658$

$\approx$ 542 snipe is 2020

65,340,000
× 2
130,760,000

$f(x) = 65.38(1.026)^x$

c. In what year will the population of Mexico be double what it was in 1980? Write the equation you would solve and explain/show briefly how you solved:

$130{,}760{,}000 = 65.38(1.026)^x$

$\sqrt{2{,}000{,}000} = \sqrt{(1.026)^x}$

$\sqrt[x]{2{,}000{,}000} = 1.026$

d. If the ***growth rate*** of the Mexican population were increased by one percent, what would be the projected population of Mexico this year? How does that compare with your original projection for this year? Show how the equation changes and how you calculate the answer.

27% → 1.027

$f(x) = 65.38(1.027)^x$

$f(35) = 65.38(1.027)^{(35)}$

$f(35) = 65.38(2.541)$

$f(35) = 166.131$

The population would be projected at 166,131,000 instead of 165,485,000. Only a 646,000 people difference. Although for a 1% difference, that is a ton of people.

3) In 2012, the population of snipe in Green Bay was 210. This year, the population was 300 snipe.

a) Define the variable t to be the number of years since 2012. Assuming that the snipe population grows exponentially, show how to determine an equation that will show the snipe population as a function of t years.

$f(t) = 210(\ ?\ )^t$

year after 2012	Snipe count
0	210
1	
2	
3	300

3 years ago

b) What is the growth rate governing the snipe population? _____

c) If this trend continues, what will be the snipe population in 2020? Show how you use your equation to answer this question.

$f(8) = 210(\ ?\ )^{(8)}$

c. In what year will the population of Mexico be double what it was in 1980? Write the equation you would solve and explain/show briefly how you solved: Aka 26.8

$F(x) = 134.76$

$134.76 = 67.38(1.026)^x$

Put in for $Y_1 =$ in calculator + $Y_2 =$

$f(27) = 134.76$

27 years after 1980 the population would have doubled in size.

d. If the ***growth rate*** of the Mexican population were increased by one percent, what would be the projected population of Mexico this year? How does that compare with your original projection for this year? Show how the equation changes and how you calculate the answer.

$F(x) = 67.38(1.036)^x$ add 0.01 to previous equation (1.026)

$x = 35 \Rightarrow F(35) = 67.38(1.036)^{35}$

$F(35) = 232.3$

The graph increased at an increasing rate.

With the old equation the population after 35 years would have been 168.46, but with this one it is 232.3

t	A(t)
0	210
3 yrs	300
8	450

3) In 2012, the population of snipe in Green Bay was 210. This year, the population was 300 snipe.

a) Define the variable t to be the number of years since 2012. Assuming that the snipe population grows exponentially, show how to determine an equation that will show the snipe population as a function of t years.

$A(t) = a \cdot b^t$

$A(0) = 210$

$A(3) = 210(b)^3 = 300$

$210(b)^3 = 300$

$\sqrt[3]{b^3} = \sqrt[3]{1.43}$

$b = 1.1$

$A(t) = 210(1.1)^t$

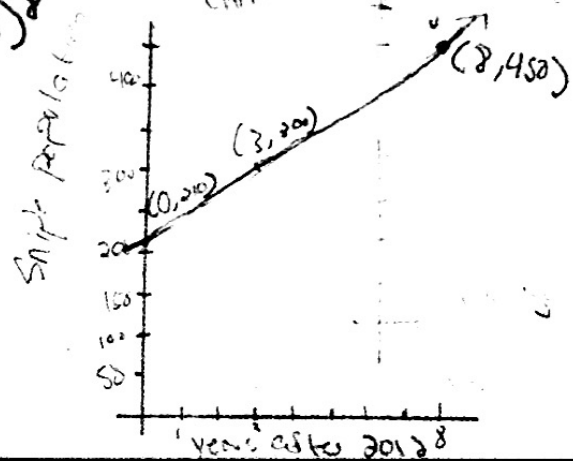
b) What is the growth rate governing the snipe population? 1.1^t t = years since 2012

c) If this trend continues, what will be the snipe population in 2020? Show how you use your equation to answer this question.

$t = 8 \Rightarrow A(8) = 210(1.1)^8$

(years after 2012) $A(8) = 450$

Check with graph on calculator



c. In what year will the population of Mexico be double what it was in 1980? Write the equation you would solve and explain/show briefly how you solved:

$f(0) = 67.38$

$f(x) = 67.38(2)$

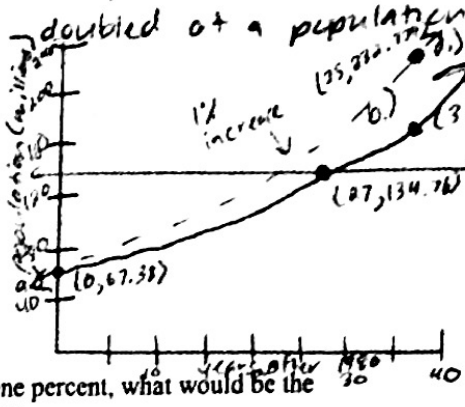
$f(x) = 134.76$ million people

$134.76 = 67.38(1.026)^x$

$2 = (1.026)^x$

$f(27) = 134.76$ million people

In 27 years which was in 2007, the population of Mexico was doubled at a population of about 135 million people.



d. If the ***growth rate*** of the Mexican population were increased by one percent, what would be the projected population of Mexico this year? How does that compare with your original projection for this year? Show how the equation changes and how you calculate the answer.

growth rate $= 2.6\% + 1\% = 3.6\%$

adding 1% to original growth rate which changes growth factor $\rightarrow$ $\left(\frac{3.6}{100}\right) + 1 = 1.036$ ← new growth factor

$f(x) = 67.38(1.036)^x$

$f(35) = 67.38(1.036)^{35}$

$= 67.38(3.448)$

$f(35) = 232.339$ million people

$232.339 - 165.46 = 66.88$ million people more

If the growth rate was increased by 1%, the population this year would be 232.34 million people, which is approximately 66.88 million people more than if the growth rate was only 2.6%. The b-value is affected and changes, and changing that value has a major impact on the results.

3) In 2012, the population of snipe in Green Bay was 210. This year, the population was 300 snipe.

a) Define the variable t to be the number of years since 2012. Assuming that the snipe population grows exponentially, show how to determine an equation that will show the snipe population as a function of t years.

t = years after 2012

$P(t)$ = snipe population

t	$P(t)$
0	210
1	236.46
2	266.25
3	300

$P(t) = a \cdot b^t$

$P(0) = 210 \cdot b^0$

$= 210 \cdot 1$

$P(0) = 210 \Rightarrow a = 210$

$P(3) = 210 \cdot b^3 = 300$

$\sqrt[3]{b^3} = \sqrt[3]{1.4286}$

$b = 1.126 \rightarrow$ growth factor

$P(t) = 210(1.126)^t$

✓ $t = 3$

$P(3) = 210(1.126)^3$

$= 210(1.428)$

$P(3) = 299.8 \approx 300$

b) What is the growth rate governing the snipe population? growth rate $= (1.126 - 1)(100) = 12.6\%$ annual growth

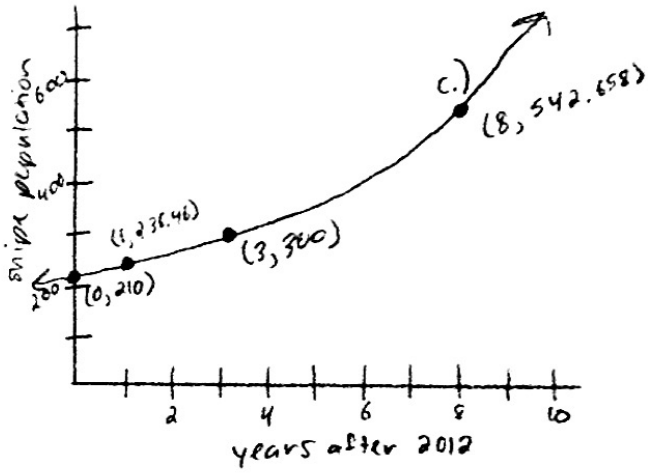
c) If this trend continues, what will be the snipe population in 2020? Show how you use your equation to answer this question.

$P(8) = 210(1.126)^8$

$= 210(2.584)$

$P(8) = 542.658$ snipes

In 8 years, which will be 2020, the snipe population will be about 543 snipes.



c. In what year will the population of Mexico be double what it was in 1980? Write the equation you would solve and explain/show briefly how you solved:

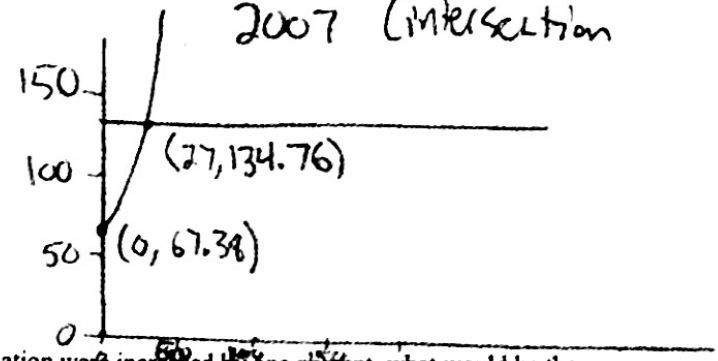
$134.76 = 67.34(1.026)^x$

$f(27) = 67.34(1.026)^{27}$

$f(27) = 67.34(2)$

$f(27) = 134.76$

for the population of mexico to be doubled it will be in 2007 (intersection



d. If the ***growth rate*** of the Mexican population were increased by one percent, what would be the projected population of Mexico this year? How does that compare with your original projection for this year? Show how the equation changes and how you calculate the answer.

$f(35) = 67.34(1.01)^{35}$

$f(35) = 67.34(1.42)$

$f(35) = 95.68$

If the population of mexico increased by 1% the population in 2015 would be 95.68 million.

$165.755 - 95.68 = 70.075$ million difference in population with differen growth rates.

3) In 2012, the population of snipe in Green Bay was 210. This year, the population was 300 snipe.

a) Define the variable t to be the number of years since 2012. Assuming that the snipe population grows exponentially, show how to determine an equation that will show the snipe population as a function of t years.

$s(t) = 300(1.1263)^t$

$s(-3) = 300(1.1263)^{-3} = 210$ snipes

$\frac{300}{210} = 1.4286$

$\sqrt[3]{1.4286} = 1.1263$

-3	210
0	300
5	544

b) What is the growth rate governing the snipe population? 1.1263^t

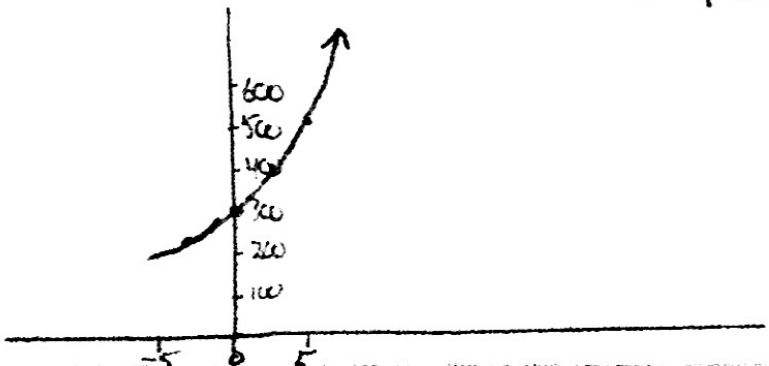
c) If this trend continues, what will be the snipe population in 2020? Show how you use your equation to answer this question.

$s(5) = 300(1.1263)^5$

$s(5) = 300(1.8172)$

$s(5) = 544$

in 2020 the snipe population will be at 544 snipes.



$f(x) = 67.38 \cdot 1.026^x$

c. In what year will the population of Mexico be double what it was in 1980? Write the equation you would solve and explain/show briefly how you solved:

$f(0) = 67.38$ million people

$67.38(2) = 134.76$

$f(x) = 134.76$ million people?

$134.76 = 67.38 \cdot 1.026^x$

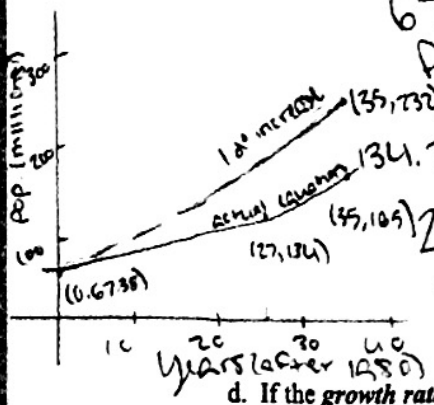
$2 = 1.026^x$

$x \approx 27$ years

$\Rightarrow 27 + 1980 = 2007$

$\boxed{2007}$

In 2007, the population of Mexico will be double what it was in 1980.



d. If the ***growth rate*** of the Mexican population were increased by one percent, what would be the projected population of Mexico this year? How does that compare with your original projection for this year? Show how the equation changes and how you calculate the answer.

original

growth factor $= 1.026$
$= 102.6\%$

growth rate $= 102.6 - 100$
$= 2.6\%$

$f(x) = 67.38 \cdot 1.026^x \rightarrow \boxed{f(x) = 67.38 \cdot 1.036^x}$

new

rate $2.6\% + 1\% = 3.6\%$

growth factor $= 100 + 3.6\%$
$= 103.6\%$
$= 1.036$

$f(35) =$ this year

$f(35) = 67.38 \cdot 1.036^{35}$

$\boxed{f(35) = 232.34 \text{ million people}}$

$\Rightarrow$ If the growth rate increased 1%, the projected population for this year in Mexico would be 232.34 million people

original $\Rightarrow 165.46$ million people

$232.34 - 165.46 = 66.88$ million people

By changing the growth rate 1%, the projected population changed by 66.88 million people

3) In 2012, the population of snipe in Green Bay was 210. This year, the population was 300 snipe.

a) Define the variable t to be the number of years since 2012. Assuming that the snipe population grows exponentially, show how to determine an equation that will show the snipe population as a function of t years.

$2015 - 2012 = 3$

$f(t) = a \cdot b^t$

$t =$ years since 2012

$f(t) =$ # of snipe

$f(0) =$ snipe in 2012
$= 210$ snipe

$a = 210$

t	0	3
$f(t)$	210	300

$f(t) = 210 \cdot b^x$

$f(3) = 210 \cdot b^3 = 300$

$\sqrt[3]{b^3} = \sqrt[3]{1.43}$

$\boxed{b = 1.126}$

growth factor $= 1.126$
$= 112.6\%$

growth rate $= 12.6\%$

$\boxed{f(x) = 210 \cdot 1.126^x}$

b) What is the growth rate governing the snipe population? 12.6%

c) If this trend continues, what will be the snipe population in 2020? Show how you use your equation to answer this question.

$2020 - 2012 = 8$

$f(8) = 210 \cdot 1.126^8$
$= 210 \cdot 2.584$

$\boxed{f(8) = 542.66 \text{ snipe}}$

$\Rightarrow$ If the trend continues, the snipe population in 2020 will be about 543 snipe

✓ $f(3) = 210 \cdot 1.126^3$
$= 299.8$
due to rounding

✓ calc