

Algebra 3

Unit 4 test: Take Home Portion

Name _____

Date Assigned _____ Date due _____

This is the take home portion of the test. You will be given the same questions in class to justify with a written statement. These questions are very involved and you should spend a significant amount of time justifying your results.

Directions:

For each of the following problems solve completely and show all of your work (Please attach any additional work to this sheet to turn in).

Provide a written justification in the space provided using complete sentences:

1.) The United States department of the interior has hired you to analyze immigration trends in the United States in the near future

a.) The number of Immigrants coming into the country each month over the next four years has been predicted to follow the equation that follows. Describe any trends that you see in the graph of the equation. What does this graph show in terms of the number of monthly immigrants over time? Are there any discontinuities in the graph? If so describe what these would represent.

$$g(x) = \frac{\frac{10}{225}x^2 + 200}{\frac{1}{225}x^2 + 4} \text{ where } x = \text{number of months from today}$$

$g(x) = \text{Monthly number of immigrants entering the US (in thousands)}$

b.) The number of Immigrants leaving the country each month over the next four years has been predicted to follow the equation that follows. Describe any trends that you see in the graph of the equation. What does this graph show in terms of the number of monthly immigrants over time? Are there any discontinuities in the graph? If so describe what these would represent.

$$L(x) = \frac{15x^2 - 72x + 100}{x^2 - 8x + 17} \text{ Where } x = \text{number of months from today}$$

$L(x) = \text{Monthly number of immigrants leaving the US (In thousands)}$

c.) The population of Immigrants in the United States changes each month depending on how many enter the United States and how many leave. This can be described as the function: $p(x) = g(x) - L(x)$ write a single function describing how the population of immigrants changes over time. What does this equation describe about the population of immigrants in the future?

P(x)=

D.) Immigration lawyers across the United States have called on the United States government to increase the number of Lawyers in the US due the incredible number of back logged cases. Every new person entering the United States has to have their case reviewed and managed by an immigration lawyer who guides them through the process. Currently there are approximately 13000 lawyers who belong to the American Immigration Lawyers Association and that number is increasing at a rate of 100 lawyers per month. Determine a single function describing the number of newly backlogged cases in the US each month as $B(x)$. Also determine when the number of backlogged cases in the US will begin to go down.

$c(x) = 3(13000 + 100x)$ This describes the number of new cases Lawyers can take on each month

$g(x) = \frac{\frac{10}{225}x^2 + 200}{\frac{1}{225}x^2 + 4}$ This describes the number of new immigrants that are entering the US each month

$B(x) = 1000 * g(x) - c(x)$ This is the number of new backlogged cases in the US

e.) If the current population of Immigrants in the US is approximately 49,000,000 use the equations you determined above to show how the population will increase or decrease monthly over the next 4 years:

Month	Pop.	Month	Pop.	Month	Pop.	Month	Pop.
April '17		April '18		April '19		April '20	
May '17		May '18		May '19		May '20	
June '17		June '18		June '19		June '20	
July '17		July '18		July '19		July '20	
Aug '17		Aug '18		Aug '19		Aug '20	
Sept '17		Sept '18		Sept '19		Sept '20	
Nov '17		Nov '18		Nov '19		Nov '20	
Dec '17		Dec '18		Dec '19		Dec '20	
Jan '18		Jan '19		Jan '20		Jan '21	
Feb '18		Feb '19		Feb '20		Feb '21	
Mar '18		Mar '19		Mar '20		Mar '21	

f.) The department of the Interior is interested in how the population of immigrants changes over time. Use the models provided to determine when the number of immigrants entering the country will be the same as the number leaving the country (where $g(x) = L(x)$) and describe how you determined these values. What will it mean for the overall population of immigrants at these points in the future?
