May-June, 2019

Dear 2019-2020 AP/IB Calculus and IB HL Year 1 Students,

Hello!!
You are receiving this letter because you signed up for AP/IB Calculus/ IB Math HL Year 1/IB Math SL for the next school year. I wanted to inform you that there is an assignment that will be due at the end of the first full week of class (Thursday/Friday August 22nd/23rd) that you may want to begin working on during the summer. Your work during the summer will be reviewing Pre Calculus topics, and learning or reviewing certain features of a graphing calculator. You can check out a graphing calculator, if you don't already have one, from Ms. Larkin in room 215 or your current Pre Calculus Teacher. In AP Calculus there will be a quiz the first full week on the use of the graphing calculator and on the Pre Calculus review material.

We will be using a TI 83/84+ graphing calculator in class and there are TI 84+s to check out. You are welcome to use another graphing calculator, as long as it does the following 4 things and is approved by the College Board:

1) produce the graph of a function within an arbitrary viewing window
2) find zeros of a function
3) compute the derivative of a function numerically, and
4) compute definite integrals numerically

If you have any questions as you do the assignment during the summer, contact each other, or contact Mr. Yezerski at jyezerski@seq.org . Working together will be essential to success in these classes. In the Fall there will be about an hour of homework each night. These are college level classes, taught at a college pace. The expectation is that you work hard in these classes to prepare for the exams at the end of the year. ***You will be expected to take the AP Calculus AB or the IB Math standard level test in May, 2020.*** *You need to be aware of this now!*

If you know of anyone planning to take AP/IB Calculus that didn't get this letter, please let me know**.**

Sincerely,

Mr. Yezerski
AP/IB Calculus Teacher for the 2019-2020 school year

AP/IB Calculus 2018 Summer Assignment

Text: Calculus: Graphical, Numerical, Algebraic, Finney, Demana, Waits, and Kennedy
ISBN #0-201-32445-8
Check it out from the school library

Graphing Calculators are available for check-out from your Pre Calculus teacher or Ms. Larkin in room 215 before school and most of the days at lunch. Graphing Calculators are required for the summer assignment and for the courses. You must have one before you go on vacation.

Part 1:

Do the following assignment from Calculus: Graphical, Numerical, Algebraic . Show all of your work/steps including writing out the original problems. This is due at the end of the first full week of classes (August 22/23). During the first full week of class, you will also be tested on the material below and on the use of the graphing calculator.

Section 1.1 # 13-19 odd, 27-35 odd, 43
Section 1.2, # 3 -45 (multiples of 3), 49, 53, 57, 63, 65
Section 1.3 # 3-21 (multiples of 3), 36
Section 1.5 # 15 – 21 (multiples of 3), 33 – 41 odd
Section 1.6, 9 – 30 (multiples of 3), 38.

Part 2: Graphing Calculator Activity: "*Which Garage is Better?*" Handout.

Note to Students:

On the graphing calculator (GDC) you should know how to do each of the following:

1) Plot the graph of a function with an arbitrary viewing window
2) Find the zeros of a function (without using the trace key)
3) Find the intersection(s) of two or more functions (without using the trace key)
4) Find the maximums and minimums of functions (without using the trace key). And
5) Be familiar with simple numerical manipulations.

Examples:

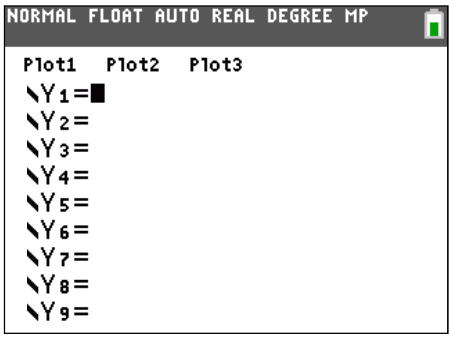
1. Use a calculator to solve the equation: $6-3^x=0$.
2. Find all the points of intersection rounded to 3 decimal places of $f(x)=3x^2-6x-2$ and $g(x)=-2x+5$.

If you have any questions over the summer, contact Mr. Yezerski at jyezerski@seq.org.

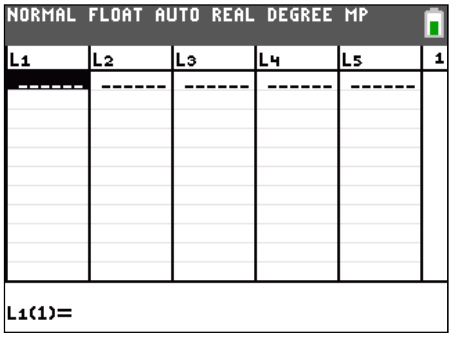
In this activity, you will explore:

- *Finding the equations for linear data in either slope-intercept or point-slope form*
- *Solving systems of linear equations using technology*

Use this document as a reference and to record your answers.



To start, you will need an empty graph window. Clear out any functions from the [Y=] screen and turn off all Stat Plots. Press [STAT] [ENTER] and make sure all the lists are cleared.



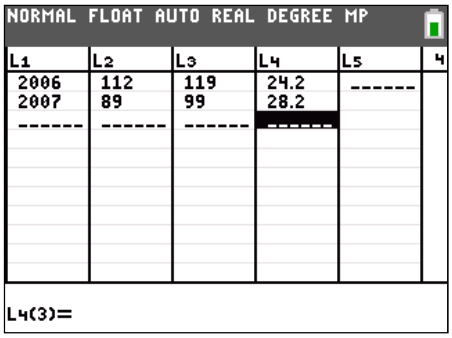
Problem 1 – Music Sales Problem

In recent years, the numbers of CDs sold in the United States has declined while digital music has become the new method for purchasing music.

The table at the right shows data of the sales, in millions, of CDs, digital albums, and individual songs for the first three months of the year.

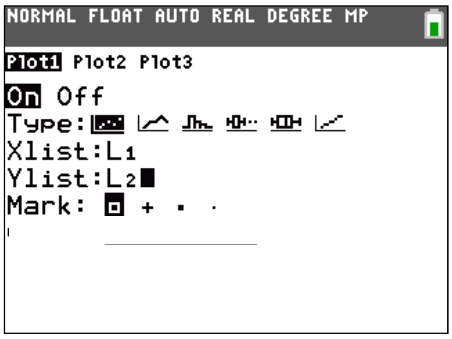
Year	CDs	Digital Albums	Individual Songs
2006	112	119	24.2
2007	89	99	28.2

Press [STAT] [ENTER] to enter the data into the lists. Enter the Year into **L1**, CDs into **L2**, Digital Albums into **L3**, and Individual Songs into **L4**.

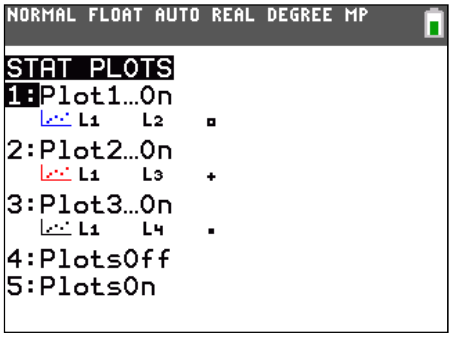


To graph the CD sales data, press [2nd] [STAT PLOT] and [ENTER] to access **Plot1**.

Make sure that the **Plot1** settings are the same as shown.



Repeat the same steps to plot digital album sales on **Plot2** and the individual song data on **Plot3**. Be sure to use L1 and L3 for **Plot2** and L1 and L4 for **Plot3**.



Find an appropriate window to see the trends before the year 2006 to after the year 2007 and indicate your window on the screen to the right.

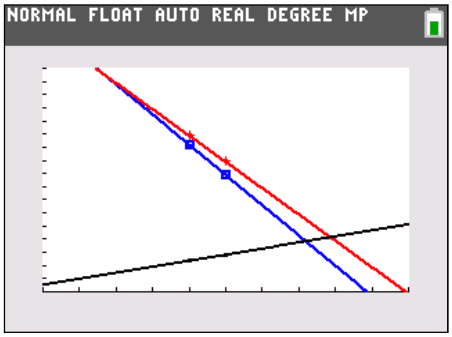
WINDOW
Xmin _____
Xmax _____
Xscl _____
Ymin _____
Ymax _____
Yscl _____

Using the data, find the equations for each of the three lines in either slope-intercept form or point-slope form.

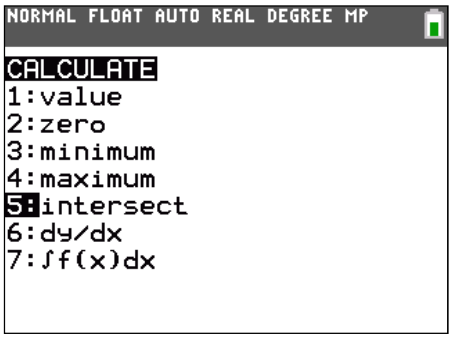
- CDs $y =$ _____
- Digital Albums $y =$ _____
- Individual Songs $y =$ _____

Next, press [Y=] and enter your equations into **Y1**, **Y2**, and **Y3**. Press [GRAPH]. You should have a similar graph as the one on the right.

Do your equations go through the data points? If not, recalculate your equations.



Find the three intersection points. To do this, press 2nd [CALC] and select **5:intersect**. The calculator will ask you for the **First curve?**, then **Second curve?**, and finally, **Guess?**. Press ENTER to each question until you have the intersection point. Repeat the process until you have all three points.



Note: You will have to move the cursor to the various graphs to pick out which ones you want to the intersection point of.

Record the points: (_____ , _____) (_____ , _____) (_____ , _____)

Questions:

1. When did the sales of digital albums overtake the sales of CDs?

2. When does the graph project that the sales of individual songs will overtake the CDs?

3. When does the graph project that the sales of individual songs will overtake the sales of digital albums?

4. As time goes on according to the graphs, it indicates the sales of CDs becoming zero. Do you think this is possible? Why or why not?

Problem 2 – Parking Garage Problem

The rates for two different parking garages are below. The **maximum** stay is 24 hours.

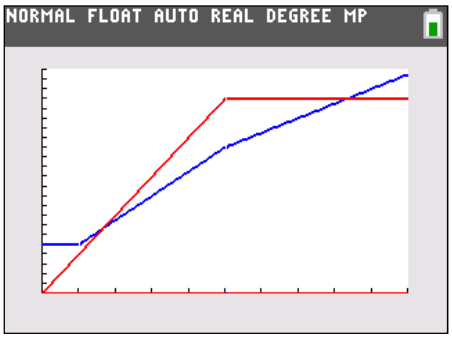
2nd Street Garage:
$10 for the 1st hour, $5/hr for the next 4 hours, and $3/hr thereafter

9th Street Garage:
$8/hr for the first 5 hours then a $40 flat fee for any hours beyond that

Write the piecewise functions that model each of the parking garages rates.

$f(x) =$ $g(x) =$

Graph *f*(*x*) and *g*(*x*) on your GDC and set an appropriate window. Your graph should look like the one to the right.



Recall: To graph a piecewise function (on your GDC) like:

$$h(x) = \begin{cases} x^2 + 2, & for\ x \le 1 \\ 2x + 7, & for\ x > 1 \end{cases}$$

You will need to enter ***Y1 = (X^2 + 2)(X ≤ 1) + (2X + 7)(X > 1).***

Using the same techniques from Problem 1, find the intersection points.

Record the points: (_____ , _____)

(_____ , _____)

Questions:

1. Which garage costs less for a short stay? For example, you go to a movie and only need parking for 2.5 hours.

2. What if you decide to go out after the movie and will need an additional 2 hours. Which garage will cost less?

3. What if you need to stay over because you stayed out too long and were too tired to drive? Assume you need an additional 12 hours. Which garage will cost less?

4. When are the two rates equal?

Miscellaneous Questions:

1. Use your GDC to sketch a graph of $f(x) = 2\sin x + \cos 2x$ in radian mode. What is the domain and range of $f(x)$? Include a sketch of $f(x)$ below.

2. Use your GDC to solve the equation $\frac{1}{2}x - 3 = \ln x - 1$. Round your answer(s) to 3 decimal places. Justify your answer(s) with a graph and/or an explanation.