The Roller Coaster Project

* Math 251 * Fall 2018 * Liz Coleman *

Group 3

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Introduction:

Basically, Troy originally copied the blueprint from the roller coaster Lab and plotted points on a graph. Because there was group concern about grading (with it designed so closely) a few of the parts were swapped and an extra hill was added.

Equations (see attached):

Label	Location	Color	Description
A(x)	$\{0 \leq x \leq 55\}$	Red	First incline. Ends after first peak
B(x)	$\{55 \leq x \leq 100\}$	Blue	Merges into A(x) @ x = 55. First decline
B'(x)	$\{55 \leq x \leq 100\}$		Derivative of B(x)
B''(x)	$\{55 \leq x \leq 100\}$		Derivative of B'(x)
C(x)	$\{100 \leq x \leq 175\}$	Black	Straight line of track to attach loop to.
L(x)	(150,45)	Green	Loop. r=25. (66% max height)
D(x)	$\{175 \leq x \leq 250\}$	Purple	Second incline (100% loop height)
E(x)	$\{250 \leq x \leq 300\}$	Red	Second drop
E'(x)	$\{250 \leq x \leq 300\}$		Derivative of E(x)
E''(x)	$\{250 \leq x \leq 300\}$		Derivative of E'(x)
F(x)	$\{300 \leq x \leq 350\}$	Blue	Last incline (Slightly > 75% previous peak)
G(x)	$\{350 \leq x \leq 500\}$	Black	Last decline and end of loop.
G'(x)	$\{350 \leq x \leq 500\}$		Derivative of G(x)
G''(x)	$\{350 \leq x \leq 500\}$		Derivative of G'(x)

*Are used for calculations only and are not graphed

Cost:

Calculations were made by finding the Y value at every X where 25 is a factor. Once all these Y values were found they were individually squared. Then the values (Cost) were added together for a total sum (Total Cost).

X (Feet)	Y (Feet)	Cost
0	0	$ -
25	75	$ 5,625.00
50	150	$ 22,500.00
75	83	$ 6,889.00
100	25	$ 625.00
125	25	$ 625.00
150	75	$ 5,625.00
175	25	$ 625.00
200	38	$ 1,444.00
225	62	$ 3,844.00
250	75	$ 5,625.00
275	45	$ 2,025.00
300	15	$ 225.00
325	36	$ 1,296.00
350	56	$ 3,136.00
375	52	$ 2,704.00
400	42	$ 1,764.00
425	28	$ 784.00
450	15	$ 225.00
475	4	$ 16.00
500	0	$ -
	Total Cost	**$ 65,602.00**

Thrill:

Step	Description	Data Point on Table
1)	Find negative slope.	
2)	Find derivative of negative slope.	Line ‘
3)	Find second derivative of negative slope.	Line ‘’
4)	Locate the minimum Y value and record the corresponding X value.	Point (x)
5)	Input the X value into the function that’s the first derivative of the line.	
6)	Your output will be the slope at point where acceleration of the line was at its greatest.	Slope
7)	Because the slope is negative we need to take its absolute value. *** In the table this step is done in Slope Thrill using “=atan(abs(x))” so items in *** aren’t on the table but relevant to the explanation ***	*** |Slope| = v ***
8)	Take the inverse tangent of the value.	*** $Tan^{-1}(v)$ ***
9)	Your output is the Thrill of that point.	Slope Thrill
10)	Repeat 1-9 for all negative slopes on coaster.	
11)	Take the sum of all Slope Thrills	Total
12)	For each peak and loop add +1 to your Total	Peaks/Loops
13)	Finished	Total Thrill

Line ‘’	Point (x)	Line ‘	Slope	Slope Thrill
B"(x)	73.08327826	B'(x)	-3.608834545	1.300480885
E"(x)	275	E'(x)	-1.8	1.063697822
G'(x)	425	G'(x)	-0.56	0.5104883219
			Total	2.874667029
		Peaks/Loops	4	
		Angle Totals	2.874667029	
			6.874667029	**Total Thrill**

Why should our roller coaster be selected by Charlie's Entertainment?

Charlie asked us to build the most thrilling roller coaster of a lifetime. What we are giving him is quite the opposite. When we were forming the design of our roller coaster, we figured that the more affordable and basic that it is, the better. Not everyone is willing to get nauseous or frightened when paying to have fun. We wanted Charlie's Entertainment to capture a wider audience and rake in more cash as a result. When going about our shape of our coaster we decided to have the most thrill at the beginning of the track. By having the most thrill toward the beginning we give the people wanting that beginning thrill again so they will re-ride the roller coaster.

In the world of entertainment, money talks. Based on conversations between our team of engineers and Charlie we have concluded that having more people at the park wanting to ride the ride is most important. Having this roller coaster be a moderate thrill level will allow for more profit to be made. Another key factor why Charlie's Entertainment should choose our roller coaster is because it is cost effective and simple. Our design should be easy to develop and any structural issues are unlikely. Overall, our design is simple, effective, and will allow people not willing to ride intense roller coasters a chance to still have fun.

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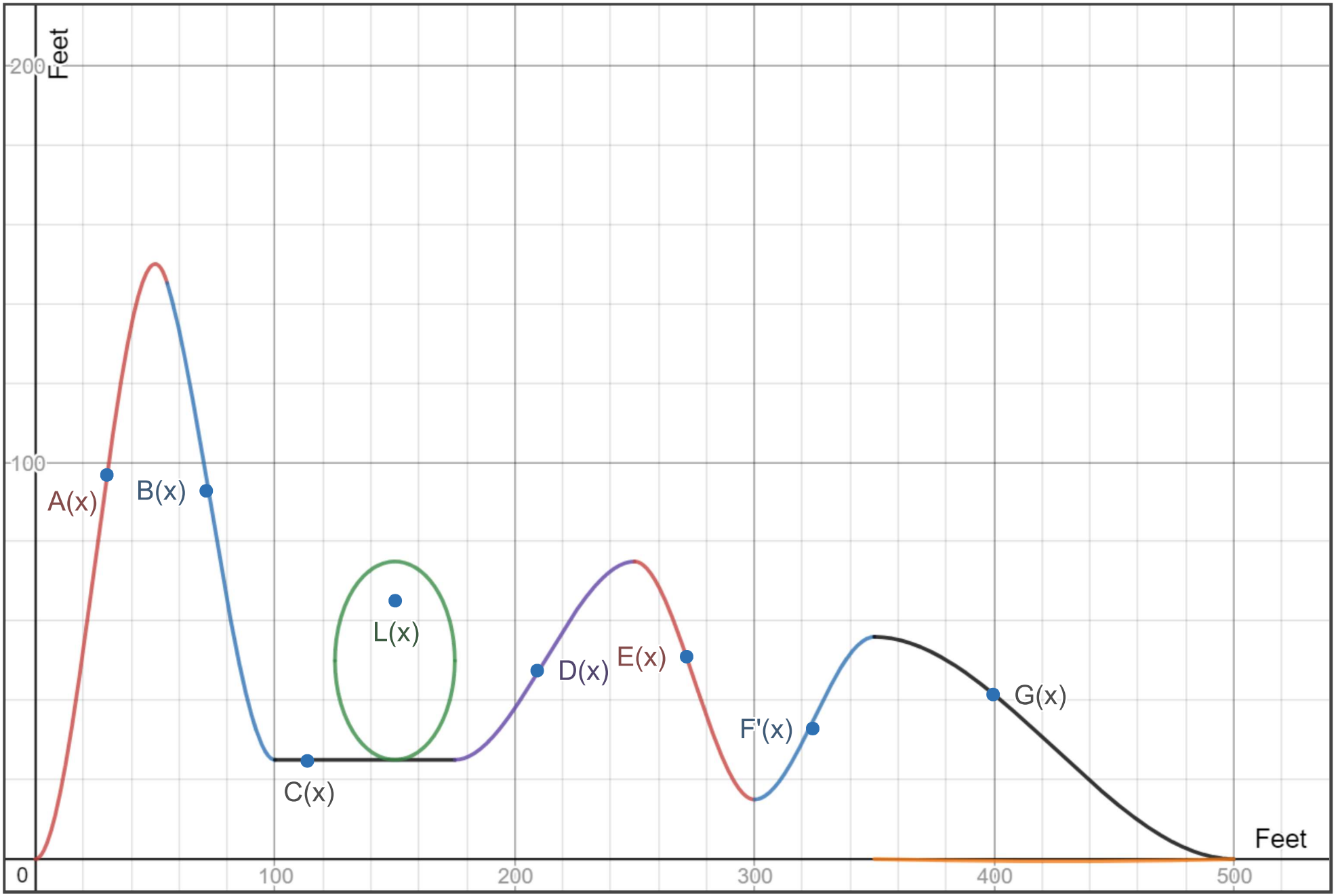
Feet
200
100
0
100
200
300
400
500
Feet
A(x)
B(x)
C(x)
L(x)
D(x)
E(x)
F'(x)
G(x)

That’s it, that’s the whole project.

Seriously, there’s nothing more.

If you insist on continuing I have to warn you that what's coming is not for the faint of heart.

It's been described as

"*overly abrasive*"

and written as though we aren't

"*qualified*".

**** Deleted Item****

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I thought this was funny but was ultimately overruled by the group. I left it in because I hope it makes you laugh!

- Troy

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Why should our roller coaster be selected by Charlie's Entertainment?

It shouldn't.

Let's be realistic, we aren't engineers so this roller coaster probably isn't safe. Unless you want a bunch of dead riders and a slew of lawsuits you should probably choose someone more qualified to design a roller coaster.

Infact, if you choose this roller coaster I would be ethically obligated to report you for the safety of the public.

I mean, I guess there isn't anything more thrilling than dying so it would probably do its job pretty well. I'm not really sure that's what people are signing up for.

Unless Charlie's Entertainment is some sort of government front and we're designing roller coasters to send to dictators abroad. Then this is probably a great design for you.