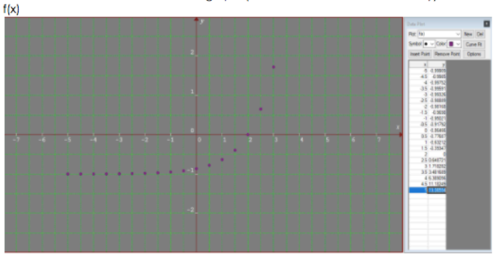
For this partial project, we will attempt to analyze different graphs with their behaviors, in order to be able to classify them and create an equation of position, velocity and acceleration. The objective of this project is to apply knowledge acquired throughout the partial like derivatives. As known, the derivative of f(x) with respect to x is the function f'(x) and is defined as:

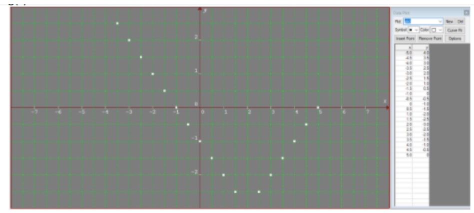
$$f'(x) = \lim_{h \to 0} [f(x+h)-f(x)]/h$$

According to some resources, the derivative is a way to represent rate of change, which refers to the amount by which a function is changing at one given point; it is the difference in y divided by the difference in x.
Similarly, the project's goal is to let the student understand the relation among several motion terms mentioned before. If we're given the function that states position, which is the space occupied by an object with respect to another object, it can be get the function of velocity, which is the rate of change of position. Hence by rate of change it can be inferred that the derivative of position is the function of velocity. So, with this information it can be known that the derivative of the function of velocity will be the function for acceleration, because this last term is the rate of change of magnitude of velocity.

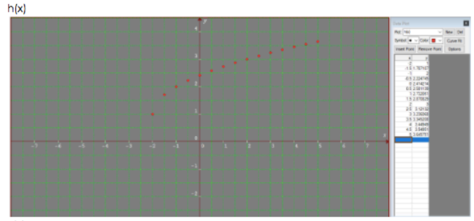
TABLE E

A. For each of the functions on the table build a graph. (horizontal axis = x; vertical axis = y)
   a. f(x)

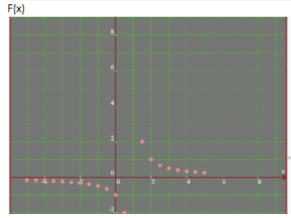




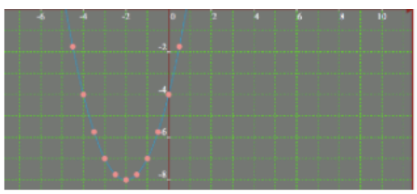
c. h(x)



d. F(x)

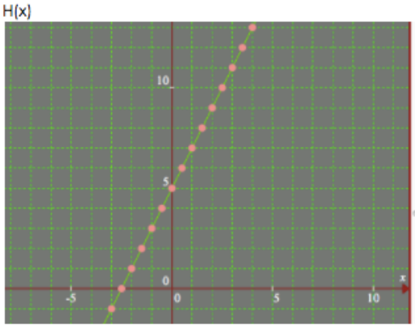


x	y
-5.0	-0.1667
-4.5	-0.1818
-4.0	-0.2
-3.5	-0.2222
-3.0	-0.25
-2.5	-0.2857
-2.0	-0.3333
-1.5	-0.4
-1.0	-0.5
-0.5	-0.6667
0	-1.0
0.5	-2.0
1.5	2.0
2.0	1.0
2.5	0.6667
3.0	0.5
3.5	0.4
4.0	0.3333



1.5	4.25
2.0	8.0
2.5	12.25
3.0	17.0
3.5	22.25
4.0	28.0
4.5	34.25
5.0	41.0

f. H(x)



-8.0	-11.0
-7.0	-9.0
-6.0	-7.0
-5.0	-5.0
-4.0	-3.0
-3.0	-1.0
-2.0	1.0
-1.0	3.0
0	5.0
1.0	7.0
2.0	9.0
3.0	11.0
4.0	13.0
5.0	15.0
6.0	17.0
7.0	19.0
8.0	21.0

B. Analyze the behavior of each graph and define the type of function that belongs to each one.
   a. f(x)
      i. By analysis, it can be seen that the graph is increasing and continuous, hence the domain is all real numbers because there are no vertical asymptotes. Nevertheless, there may be an horizontal asymptote in y=-1. Also, due to the fact that the graph is increasing from (-∞,+∞) the base must be greater than 1. With this behavior we can infer that it's an exponential graph. Hence, the type of function is exponential.
   b. g(x)
      i. In the graph of g(x), it can be seen how the graph is elevated to the second power. This means that the graph would be a parabola, by having the positive and negative numbers with different signs. In the y axis they start decreasing and then increasing constantly. The parabola will have a domain of (-∞,+∞), and a range of (-2.5, +∞)
   c. h(x)
      i. In the analysis, and with the software we can see how the graph is a square root with an absolute value. The graph has a positive slope going up from left to right. If we only analyze the points plotted we could say that the domain is in (-5, 5) and the range is of (-2, 5).
   d. F(x)

the behavior of the graph.

e. G(x)
   i. By analysing this graphing the plotted point, we find out the graph is a par
   Its initial vertex is in (-2, -8). It has a vertical x, that is why it is going upwarc
   x-intercepts in (-2+2√2,0) and (-2-2√2,0). In the y-intercepts there is (0, -
   domain is from (-∞,+∞) and the range is of [-8, +∞).

f. H(x)
   i. The graph of H(x) is a linear function. The main characteristic of a linear fu
   is simply based on the formula of y=mx+b. In this formula for the slope v
   use 2 and for the y intercept we can change it for 5 upward. The form
   give us the H(x)=2x+5.

C. Use the information (values) from the table of position to establish the specific **equa
Position that matches each one. *(procedures at the end)*

a. f(x) = $2e^{(x-2.7)} - 1$
b. g(x) = $|x-2| - 3$
c. h(x) = $\sqrt{x+2} + 1$
d. F(x) = $\frac{1}{(x-1)}$
e. G(x) = $x^2 + 4x - 4$
f. H(x) = $2x + 5$

D. Using the equation of position that you found previously for each graph, find the **equa
velocity and the **equation of acceleration** for each graph. *(procedures at the end)*

a) f(x) = $2e^{(x-2.7)} - 1$
   i) v(x) = $2e^{(x-2.7)}$
   ii) a(x) = $2e^{(x-2.7)}$
b) g(x) = $|x-2| - 3$
   i) v(x) = $(x-2(/|x-2|$
   ii) a(x) = $(x - |x-2| - 2)(x + |x-2| - 2)/(|x-2|^3)$
c) h(x) = $\sqrt{x+2} + 1$
   i) v(x)= $\frac{1}{2\sqrt{x+2}}$
   ii) a(x) = - $\frac{1}{4\sqrt{(x+2)^3}}$
d) F(x) = $\frac{1}{(x-1)}$
   i) v(x)= $-\frac{1}{(x-1)^2}$
   ii) a(x) = $\frac{2}{(x-1)^3}$
e) G(x) = $x^2 + 4x - 4$
   i) v(x) = $2x + 4$
   ii) a(x) = 2
f) H(x) = $2x + 5$
   i) v(x) = 2
   ii) a(x) = 0

María José: In this project we analysed the behavior of several types of graphs including linear all the way to square root or absolute values. The analysis of the graphs helped us out to remember the past topics of other semesters. In this partial we learned how to derivate functions, and one of the topics were the derivatives of position, velocity and acceleration. We have the opportunity to of using this skills with the different graphs that came from the plotted points. We also learned a new way of using graphmatica, including how to take functions out of the points.

Regina: In this project we were able to apply all acquired knowledge throughout the semesters, because it is known that calculus is the combination of previous knowledge like algebra, trigonometry, among other topics. In this partial, apart from the fact that we analysed graphs, we reinforced the theory of different types of functions with its transformations and also to apply the formulas and theory acquired for derivatives. Also, we realized how physics and math are related, due to the fact that by getting the slope of the function of position, the function of velocity can be obtained and hence the function for acceleration.

PROCEDURES