Applied Math 30S

Name: _____

Unit 4: Quadratic Functions

Hand-In Assignment 1

For the questions on this page, sketch a graph of the quadratic function (if required) and provide the information requested for each function.

1. Direction of opening: _____

   Sign of leading co-efficient: _____

   End behaviour: _____

   y-intercept: _____

   x-intercept(s): _____

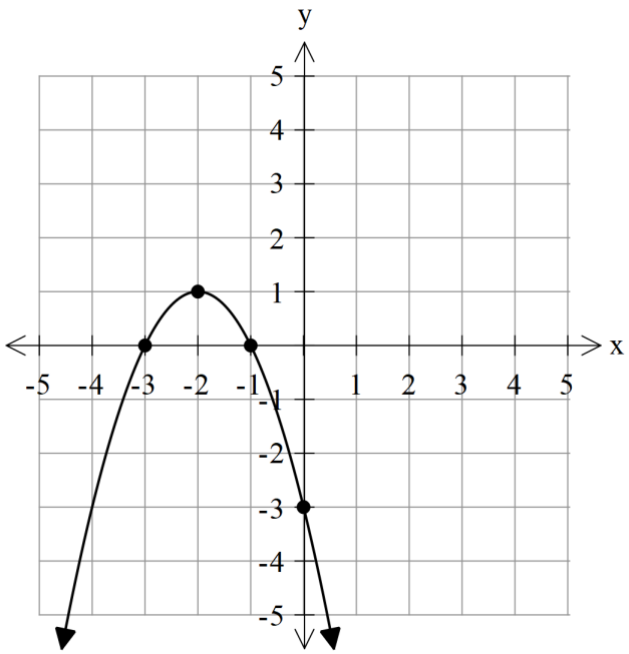
   Vertex: _____

   Minimum value (or N/A): _____

   Maximum value (or N/A): _____

   Domain: _____

   Range: _____



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2. $y = 0.01x^2 - 0.8x - 14$ **(Sketch the graph.)**

   Direction of opening: _____

   Sign of leading co-efficient: _____

   End behaviour: _____

   y-intercept: _____

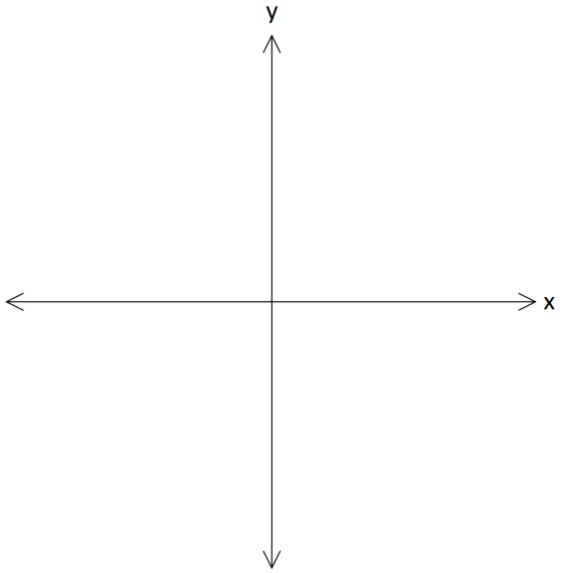
   x-intercept(s): _____

   Vertex: _____

   Minimum value (or N/A): _____

   Maximum value (or N/A): _____

   Domain: _____ Range: _____



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Unit 4: Quadratic Functions Hand-In Assignment 2

Complete the following questions and hand-in this assignment when you're finished. If rounding is necessary, round to ***two decimal places***.

1. The amount of money Gord gets to spend on videogames each month (M) can be described according to the equation $\boldsymbol{M = 10 + 4.25h}$, where h is the number of hours that Gord spends doing housework the month previous.

a) Sketch a graph of this equation. Be sure to include ***labels*** and a ***scale*** on each axis.

b) If Gord does housework for a back-breaking 12.6 hours last month, determine the amount of money he will get to spend on videogames this month.

c) If Gord spent $159 on videogames this month, determine the number of hours he must have spent doing housework last month.

2. The amount of revenue made in one month by a company that sells toy cars is dependent on the selling price they set for one toy car. If they charge too little, they lose out on money for each sale. If they charge too much, people will stop buying their product (reducing their revenue). They would like you to help them set the optimal price for one toy car.

A statistician has reviewed the data from previous sales, and they have determined that the company's revenue for one month can be determined from the equation:

$$R = -4000c^2 + 20000c - 10000$$

where c is the cost of one toy car and R is the revenue earned in one month.

a) Draw a sketch of the graph of this function. Label and provide coordinates for the vertex and all intercepts.

b) Determine the maximum amount of revenue that this company can expect to make in one month.

c) What price should they sell one toy car for so that the company receives maximum revenue?

d) At what toy car prices will the company see NO revenue?

3. Scientists have been tracking a small asteroid that was heading towards Earth, got close, and then sped away from the Earth. They measured the distance starting on day '1', and then re-measured every three days after that. The data they collected is shown in the table below.

Time (days)	1	4	7	10	13	16
Distance from Earth (millions of kilometres)	1.75	0.93	0.54	0.87	1.57	3.95

a) Plot the points given on your TI-84 and examine the resulting scatterplot. State the type of function that would be the best approximation for the points shown.

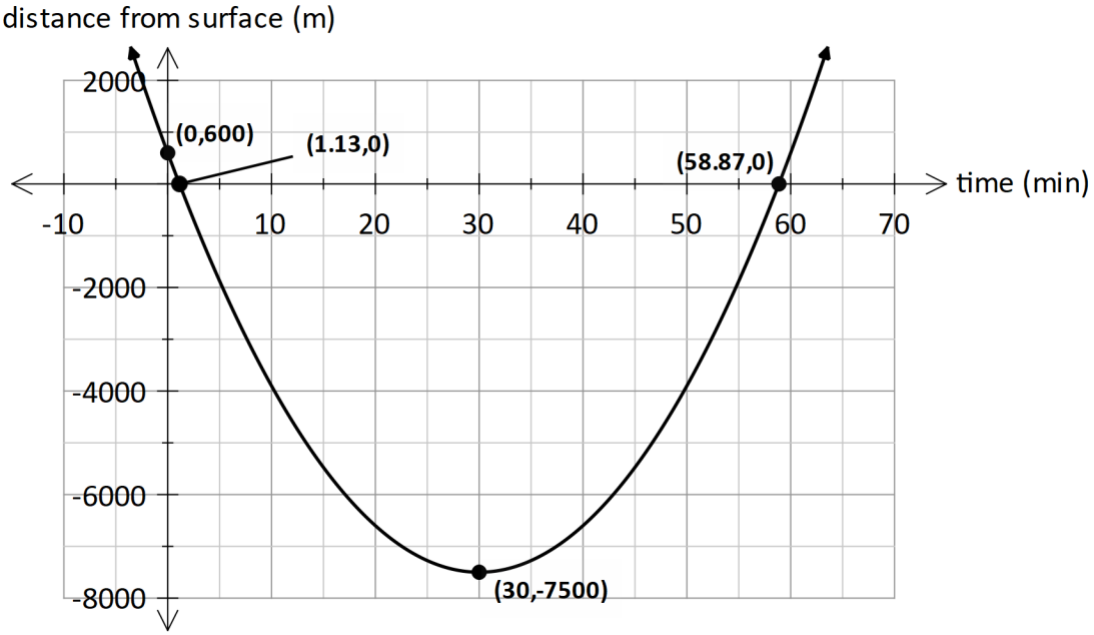
b) Sketch the scatterplot of this data.

c) Determine the appropriate regression equation for this data and write it below. Also, add the line or curve of best fit to your scatterplot in part b).

d) Scientists become concerned when any asteroid comes within 1 million kilometres. At what time will this asteroid first reach 1 million kilometres from Earth?

e) Use your regression equation to determine how close the asteroid got to the Earth.

4. A small remotely-controlled submarine used for mapping the ocean floor is shot (at time $t = 0\ minutes$) straight down from a plane flying 600 m above the surface of the water in the Indian Ocean. It slows as it approaches the ocean floor, and then finally stops its descent and begins to float back up to the surface. The distance that the submarine is from the surface of the water at various times is shown by the graph below.



a) What is the deepest point reached by the submarine?

b) When does the submarine reach its deepest point?

c) When does the submarine hit the surface of the water for the first time?

d) When does the submarine resurface after its time under the water?

Complete the following questions and hand-in this assignment when you're finished. If rounding is necessary, round to ***two decimal places***.

5. Solve the following system of equations. Sketch the graph of the system and state the solution(s).

$$y = \frac{1}{2}x + 11$$
$$y = -2x + 40$$

BONUS QUESTION

6. The City of Winnipeg is conducting a review of public pools in the city. They are tracking the attendance at each pool each day, starting at day '0'. Since day '0', attendance at Bonivital pool has increased steadily while attendance at Sergeant Tommy Prince Place pool first rose then fell. Equations modeling the daily attendance (A) and number of days since opening day (d) are shown below.

Bonivital: $A = 28d + 4$
Sergeant Tommy Prince Place: $A = -d^2 + 39d + 64$

a) On what day(s) (after day '0') was the attendance the same at both pools?

b) What was the attendance on the day(s) referenced in a)?