First name: _____ Last name: _____ Student ID: _____

Chapter 4 Quadratic Functions (1) homework

1. Using finite differences to determine whether the relation is linear, quadratic, or neither.

a)

x	y
0	4
1	5
2	6
3	7
4	8

b)

x	y
0	3
1	4
2	7
3	12
4	19

c)

x	y
1	0
3	1
5	8
7	27
9	64

d)

x	y
−2	6
1	0
4	12
7	42
10	90

2. Given the standard form of quadratic relation $y = ax^2 + bx + c$. Make a table of values when x is -2, -1, 0, 1, 2, then find the first and the second differences. Relate the second differences to a. Are there any relationships?

3. The zeros of a quadratic relation are -2 and 5, and the second differences are all negative.
a) Explain whether the optimal value will be a maximum or a minimum using the conclusion from #2.

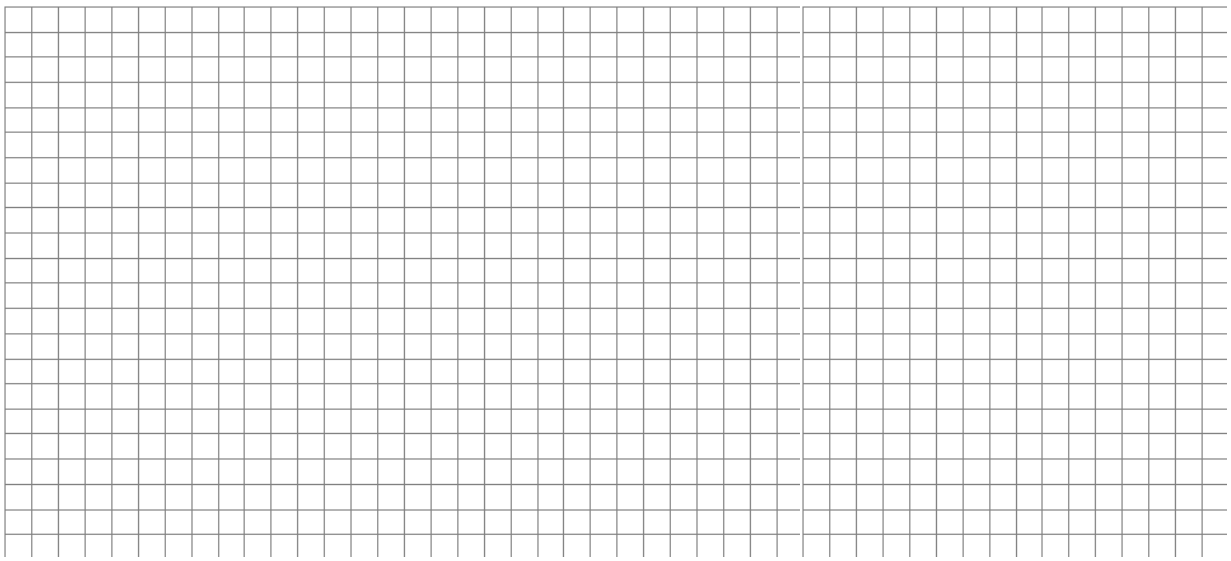
b) What value of the independent variable will produce the optimal value?

c) Will the optimal value be positive or negative? Explain.

4. Two points on a parabola are (4, -1) and (-10, -1). What is the equation of the axis of symmetry?

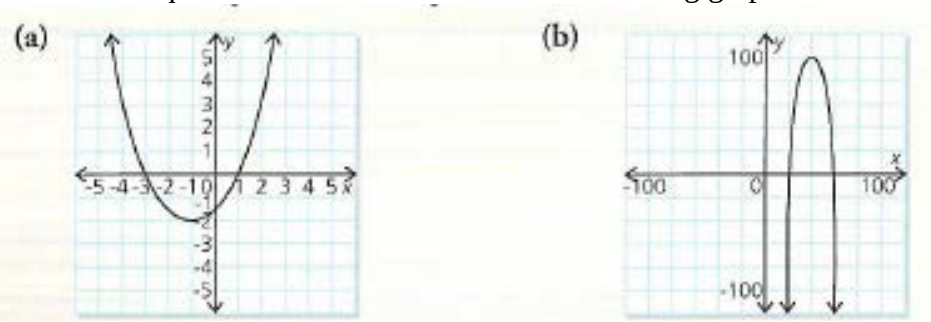
5. Fill in the blanks for each parabola. Then sketch the parabolas.

Properties	**a) $y = -x^2 + 4x$**	**b) $y = x^2 + 3x + 2$**	**c) $x^2 – 4x + 4$**	**d) $y = 2x^2 + 9x + 9$**
Zeros				
Equation of AOS				
Vertex				
Direction of opening				
Max / min				
Optimal value				
y-intercept				



6. If the graph of a quadratic function has two x intercepts -2, 1 and it passes through (2, 8). Find the function in factored form.

7. Find the equation in standard form for the following graphs.



8. Determine the quadratic equation for a parabola with
a) zeros at 5 and 9, and an optimal value of -2

b) zeros at -9 and -5, and a y-intercept of 8

9. The stainless steel Gateway Arch in St. Louis, Missouri, is parabolic in shape. It is 192 m from the base of the north leg to the base of the south leg. The arch is 192 m high. Determine an algebraic expression, in standard form, that models the shape of the arch. Draw a diagram!

10. A football is kicked into the air. Its height above the ground is approximated by the relation $h = 20t - 5t^2$, where h is the height in metres and t is the time in seconds since the football was kicked.

a) What are the zeros of the relation? When does the football hit the ground?

b) What are the coordinates of the vertex?

c) Graph the relation.

d) What is the maximum height reached by the football? After how many seconds does the maximum height occur?

11. Rahj owns a hardware store. For every increase of 10 cents in the price of a package of batteries, he estimates that sales decrease by 10 packages per day. The store normally sells 700 packages of batteries per day, at $5.00 per package.
a) Determine an equation for the revenue R.
Hint: Let x be number of 10 cents increases.

Price = _____

Number of packages sold = _____

Revenue = Price x Number of items sold

= _____

b) What is the maximum daily revenue that Rahj can expect from battery sales?

c) How many packages of batteries are sold when the revenue is at a maximum?