5.1: Introducing the Quadratic Function

Quadratic functions are the group of functions comprising $f(x) = x^2$ and related transformed functions.

Many phenomena can be modelled (described) using quadratic functions. Examples would include: the motion of objects falling under gravity or the shape of the cables on a suspension bridge.

<u>Recognizing Quadratic Functions</u>

1. From a Graph.

2. From an Equation.

- In equations, QFs will contain a term with an exponent "2" on the variable.
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3. In a Table of Values.

In a table of values, if the SECOND DIFFERENCES are the same, then it is a quadratic function. (if the FIRST DIFFERENCES are the same it is a linear function).

x	f(x)	First Differences	Second Differences
-3	9		
-2	4		
-1	1		
0	0		
1	1		
2	4		
3	9		

Properties of QFs

i) Domain – for most QFs, the domain is the real numbers.

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ii) Direction of opening – QFs either open up or down.

iii) Vertex – the vertex of a QF is either the lowest point or the highest point and is given as an ordered pair of (x-coordinate, y-coordinate)

iv) Axis of Symmetry – in QFs the axis of symmetry is the imaginary vertical line that passes through the vertex and divides the QF into two mirror images. The equation of the AOS is the equation of a vertical line passing through the vertex.

v) Range – The range of a QF is always …

a. For a parabola that opens up…

b. For a parabola that opens down…