

Quadratic Functions Review

Ex/ For each of the following relations, state:

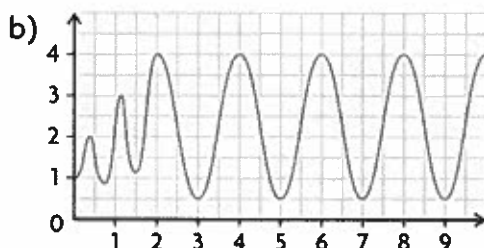
- the domain and range
- whether it is a function or not

a) $f = \{(1,2), (3,1), (4,2), (7,2)\}$

i) $D: \{x \in \{1, 3, 4, 7\}\}$

$R: \{y \in \{1, 2\}\}$

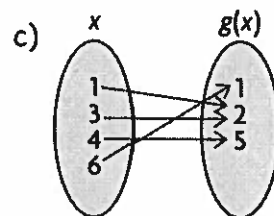
ii) Function



i) $D: \{x \in \mathbb{R} \mid 0 \leq x \leq 10\}$

$R: \{y \in \mathbb{R} \mid 0.5 \leq y \leq 4\}$

Function



i) $D: \{x \in \{1, 3, 4, 6\}\}$

$R: \{y \in \{1, 2, 5\}\}$

Function

Ex/ Use finite differences to determine if the table below shows a quadratic relation.

Time (s)	Height (m)
0	0
1	30
2	40
3	40
4	30
5	0

$$\begin{aligned} &> +30 > -20 \\ &> +10 > -10 \\ &> +0 > -10 \\ &> -10 > -10 \\ &> -30 > -20 \end{aligned}$$

$\therefore$ Not quadratic

Ex/ For $f(x) = x^2 - 2x + 3$, determine:

a) $f(-1)$
 $= (-1)^2 - 2(-1) + 3$
 $= 6$

b) $f(2)$
 $= 2^2 - 2(2) + 3$
 $= 3$

c) $f(-3)$
 $= (-3)^2 - 2(-3) + 3$
 $= 18$

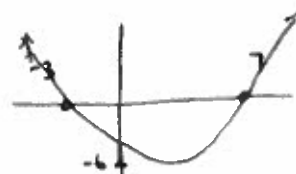
d) $f(2) - f(-1)$
 $= 3 - 6$
 $= -3$

already know!

Ex/ The zeros of a quadratic relationship are -3 and 7. The optimal value of the relationship is -6.

- Is the optimal value a maximum or a minimum? Explain.
- Is the y-intercept positive or negative?
- Are the 2nd differences positive or negative.

- min - opens up
- negative
- positive



Ex/ Describe the transformations that have been applied to the graph of $y = x^2$ in each case, then sketch its graph.

a) $y = 2(x+1)^2$

- vertical stretch by 2
- left 1

$V(-1, 0)$

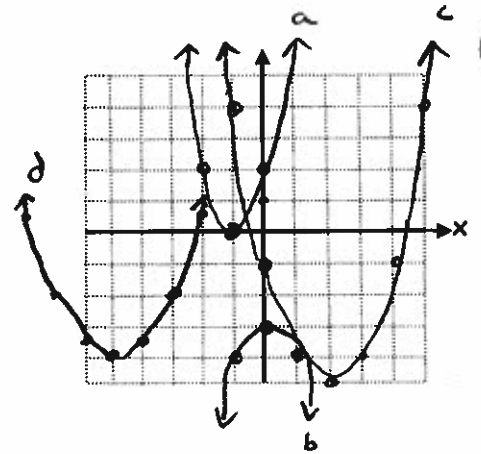
step = 2 (1, 3, 5)
= 2, 6, 10

b) $y = -x^2 - 3$

- v. reflection
- down 3

$V(0, -3)$

step = -1 (1, 3, 5)
= -1, -3, -5



c) $y = (x-2)^2 - 5$

- right 2
- down 5

$V(2, -5)$

step = 1, 3, 5

d) $y = \frac{1}{2}(x+5)^2 - 4$

- v. compress by 2
- left 5
- down 4

$V(-5, 4)$

step = $\frac{1}{2}$ (1, 3, 5)
= 0.5, 1.5, 2.5

Ex/ Determine the equation of the quadratic in vertex form given that its vertex is located at (2,8), it has been vertically compressed by a factor of 8 and opens downwards.

$$y = -\frac{1}{8}(x-2)^2 + 8$$

Ex/ The function $h(t) = -5t^2 + 20t + 2$ gives the height of a thrown football t seconds after it is thrown. The ball hit the ground before a receiver could catch it.

- What was the initial height of the ball?
- What was the maximum height reached by the ball? When did this occur?
- For how many seconds was the ball at a height of at least 17 m?
- What is the domain and range of the function?

a) 2 m

b) max of 22 m
at 2 sec

c) Above 17 m
from 1 to 3 sec
So, for 2 sec

d) $D: \{x \in \mathbb{R} \mid 0 \leq x \leq 4.098\}$
 $R: \{y \in \mathbb{R} \mid 0 \leq y \leq 22\}$

Desmos