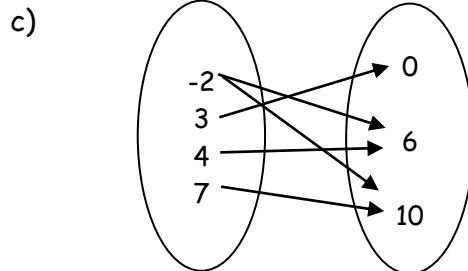
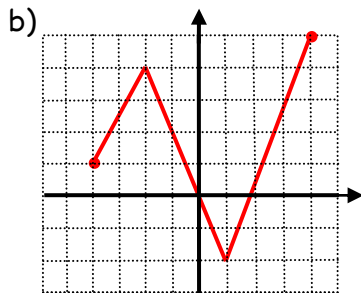
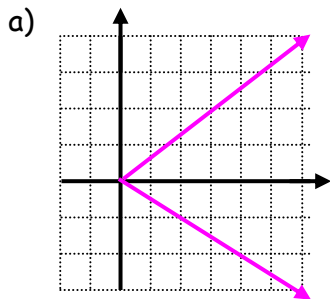


Quadratic Functions Review

1. Determine if the following relations are functions. For each, state the domain and range.



2. If $f(x) = 2x + x^2$, find;

a) $f(-4)$

b) $f(3)$

c) $2f(3) - f(-4)$

3. Given the following tables of values, use finite differences to determine if they represent functions that are linear or quadratic.

x	-2	-1	0	1	2
y	-9	-5	-1	3	7

x	0	1	2	3	4
y	-3	-1	5	15	29

4. The x-intercepts of a quadratic relation are -2 and 6. The second differences are negative.

a) Which direction will the parabola open? Explain.

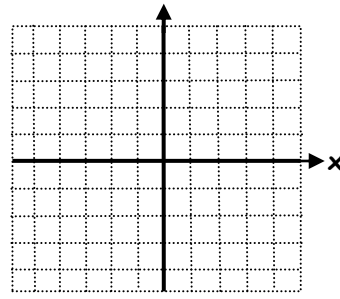
b) Is the optimum value positive or negative?

c) Is the y-intercept positive or negative?

5. Write an equation for a parabola with a vertex at (1,4) that is narrower than $y = x^2$ and opens downwards.

6. For each of the following, identify:

- i) the transformations to $y = x^2$
- ii) the direction of opening
- iii) the vertex
- iv) the axis of symmetry
- v) the number of zeros
- vi) Sketch



a) $y = 4(x + 2)^2$

b) $y = (x - 3)^2 - 5$

c) $y = \frac{1}{2}x^2 - 4$

8. Consider a parabola with a vertex of $(5, -4)$ that is congruent with $y = x^2$ and opens up. Determine its new equation under the following conditions:

- a) It has been compressed vertically by a factor of 3.
- b) It has been reflected vertically and moved down 1.
- c) It moves right 4 and up 5.

9. A stone was thrown from the top of a cliff 60 m above sea level. The height of the stone above sea level t seconds after it was released, is given by $h(t) = -5t^2 + 20t + 60$ metres.

- a) Graph the function with Desmos.
- b) Find the time taken for the stone to reach its maximum height.
- c) Find the maximum height above sea level reached by the stone.
- d) How long did it take before the stone struck the water?
- e) State the domain and range.