

Assignment 6

G11 MCF3M Functions and Applications

Due date: Tue 18 December 2018

December 14, 2018

1 Comments

Below, you may find the 5 exercises that comprise this assignment. These are exercises: 10, 11, 12, and 14. Also, from exercise 13 do

- From case a), the first 2 functions
- From case b), the first 2 functions

Note: Question 14 will require you to do it with Geogebra. You can use either your phone or, if you installed Geogebra in your computer, the computer. In both cases, once you plot all those functions, take a snapshot, aka, screenshot! You must submit this snapshot with the rest of your answers.

All questions have weigh 22.5% towards the final mark of the assignment, except question 11, which weighs 10% towards that mark.

Make sure you take note of the due date and submit it on time.

Submission process: Via email to msantos@dragonacademy.org

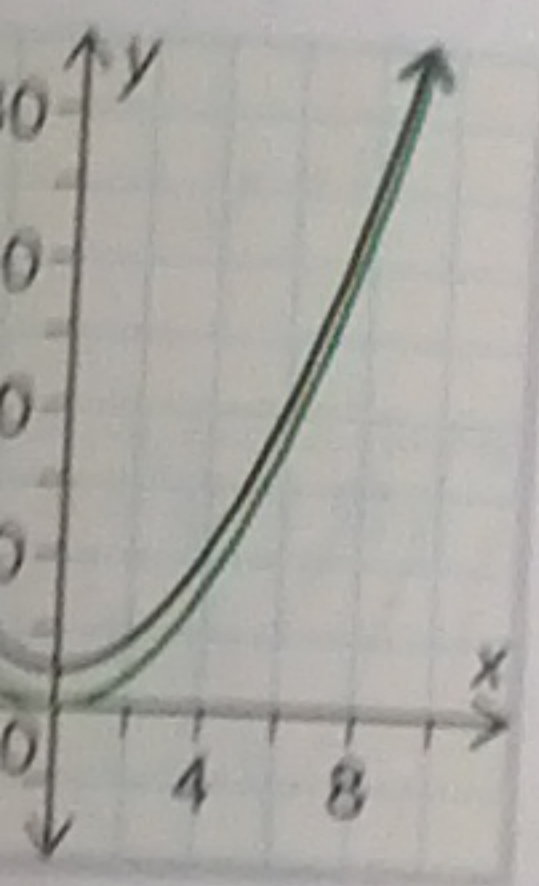
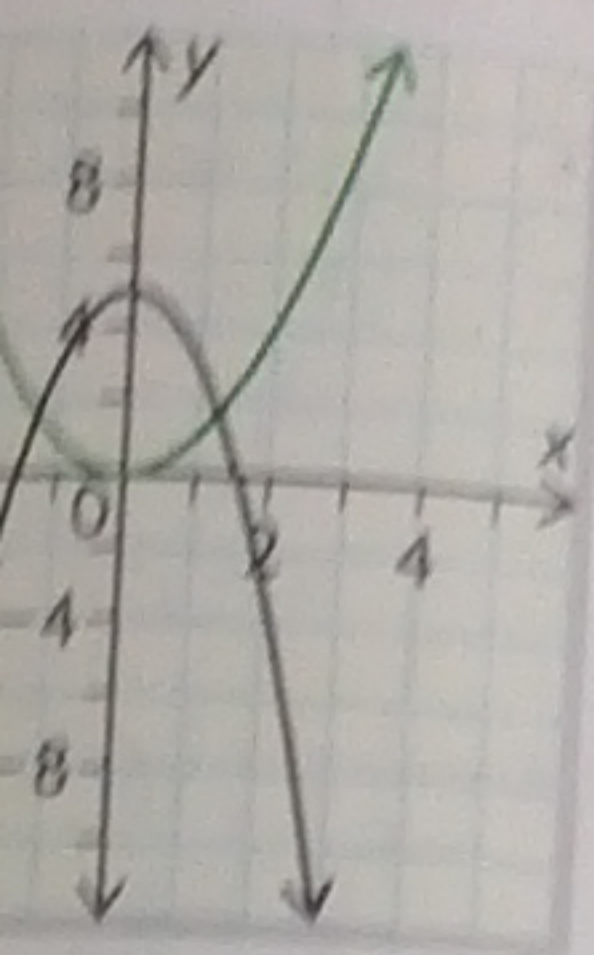
- **If you write your answers on a computer:** submit these answers as an attachment via email. Add as well the snapshot you took for exercise 14 as another attachment in the same email.

- **If you write your answers on paper:** Take a picture of all your sheets. Submit those pictures together with the snapshot of exercise 14 as attachments via email.

The graph of $y = x^2$ is

$$x^2 + 5$$

$$(x + 5)^2$$



$y = x^2$ to obtain a
graph.

$$(x + 4)^2$$

and with vertex at
results if P is

the x -axis
axis, and translated

and with vertex
results if P is

its up
it down

7. Write an equation of a parabola that satisfies each set of conditions.

- opens upward, congruent to $y = x^2$, and vertex $(0, 4)$
- opens upward, congruent to $y = x^2$, and vertex $(5, 0)$
- opens downward, congruent to $y = x^2$, and vertex $(5, 0)$
- opens upward, narrower than $y = x^2$, and vertex $(2, 0)$
- opens downward, wider than $y = x^2$, and vertex $(-2, 0)$
- opens upward, wider than $y = x^2$, and vertex $(1, 0)$

8. Determine the answers to the following questions for each of the given transformed quadratic functions.

- How does the shape of the graph compare with the graph of $f(x) = x^2$?
- What are the coordinates of the vertex and the equation of the axis of symmetry?
- Graph the transformed function and $f(x) = x^2$ on the same set of axes.
- Label the points $O(0, 0)$, $A(-2, 4)$, and $B(1, 1)$ on the graph of $f(x) = x^2$. Determine the images of these points on the transformed function. Label the images O' , A' , and B' .

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

9. For each of the following, state the equation of a parabola congruent to $y = x^2$ with the given property.

- The graph is 2 units to the right of the graph of $y = x^2$.
- The graph is 4 units to the left of the graph of $y = x^2$.
- The graph is 4 units to the left and 5 units down from the graph of $y = x^2$.
- The graph is vertically compressed by a factor of 4.
- The graph is vertically stretched by a factor of 2 and is 4 units to the left of the graph of $y = x^2$.
- The graph is vertically stretched by a factor of 3 and is 2 units to the right and 1 unit down from the graph of $y = x^2$.

10. For each of the following, state the condition on a and k such that the parabola $y = a(x - h)^2 + k$ has the given property.

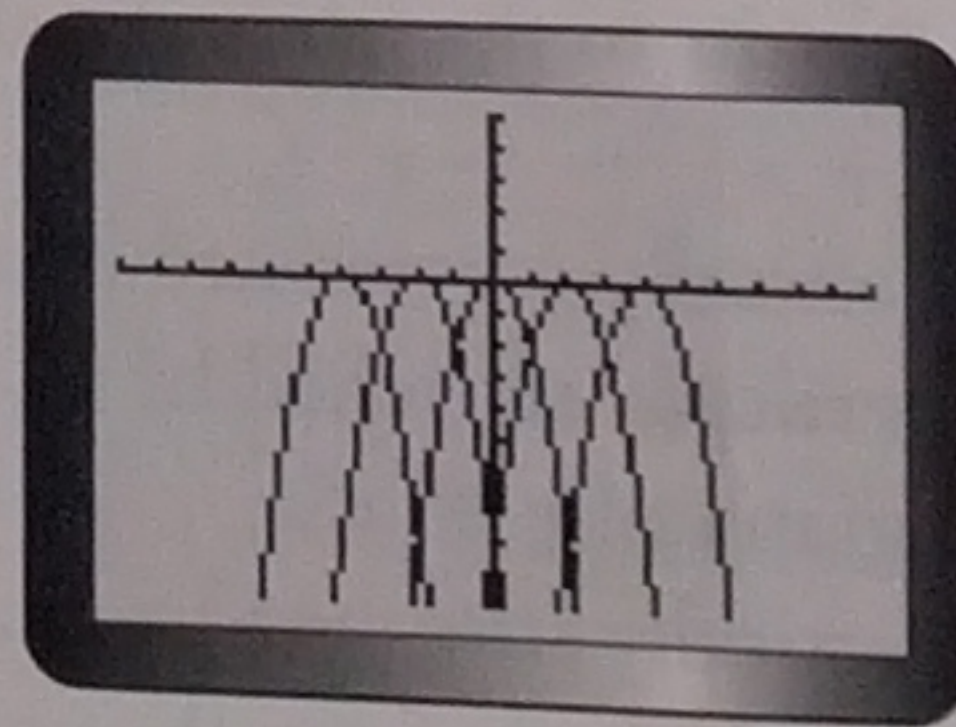
- The parabola intersects the x -axis at two distinct points.
- The parabola intersects the x -axis at one point.
- The parabola does not intersect the x -axis.



11. The acceleration due to gravity, g , is 9.8 m/s^2 on Earth, 3.7 m/s^2 on Mars, 10.5 m/s^2 on Saturn, and 11.2 m/s^2 on Neptune. The height, $h(t)$, of an object, in metres, dropped from above each surface is given by $h(t) = -0.5gt^2 + k$.
- Describe how the graphs will differ for an object dropped from a height of 100 m on each of the four planets.
 - On which planet will the object be moving fastest when it hits the surface?
 - On which planet will it be moving slowest?
12. Describe how the x - and y -coordinates of the given quadratic functions differ from the x - and y -coordinates of corresponding points of $y = x^2$.
- $y = (x + 7)^2$
 - $y = x^2 + 7$
 - $y = -2(x - 4)^2$
 - $y = -\frac{1}{2}x^2 - 4$

Extending

13. Predict what the graphs of each group of equations would look like. Check your predictions by using graphing technology.
- $f(x) = 10x^2$
 $f(x) = 100x^2$
 $f(x) = 1000x^2$
 $f(x) = 10000x^2$
 - $f(x) = 0.1x^2$
 $f(x) = 0.01x^2$
 $f(x) = 0.001x^2$
 $f(x) = 0.0001x^2$
14. a) If $y = x^2$ is the base curve, write the equations of the parabolas that produce the following pattern shown on the calculator screen below. The scale on both axes is 1 unit per tick mark.



- b) Create your own pattern using parabolas, and write the associated equations. Use $y = x^2$ as the base parabola.