The Dragon Academy G11 Functions and Applications Review Package **Due date: Mo. 17 June 2019**

1. Write the set of figure 1. A =



Figure 1: The set A

2. Write the expression of the relation R from figure 2. R =



Figure 2: Relation R

- 3. Write the domain, Dom(R), and the range, Range(R), of R.
 - Dom(R) =Range(R) =
- 4. Consider the relation from figure 2. Is it a *function*? Why?
- 5. Sketch the diagram of this relation $I = \{(0,5), (3,0), (1,5)\}$ and state wether I is a function or not.

6. Write the general expression of the quadratic equation and the formula for its solutions, then solve this equation: $4x^2 - 44x + 121 = 0$

7. How many zeros does the function $f(x) = 4x^2 - 44x + 121$ have? Find them and sketch the function

- 8. Write three different examples of quadratic functions f(x), g(x) and h(x) in the form specified below
 - (a) Standard form: f(x) =
 - (b) Vertex form: g(x) =
 - (c) Factor form: h(x) =
- 9. Write in standard form your function in option (8b) above. Make sure to show all steps of your derivation.

10. Using the axes provided below, sketch the functions

- (a) $f(x) = -x^2$
- (b) $g(x) = 0.5(x+3)^2 + 1$
- (c) h(x) = 3(x-5)(x-3)

Make sure to label each curve you draw as well as the location of the vertices.



11. Determine the two intersection points, **A** and **B**, between the parabola $y = \frac{1}{2}(x-1)^2 - 4$ and the line y = 2x+1.

A	=	(,)
В	=	(,)



12. Determine how many times does the line y = -5(x+4) - 1 intersect the parabola $y = \frac{1}{2}(x-1)^2 - 4$.

- 13. A given angle A is such that $\sin(A) = \sqrt{3}/2$.
 - (a) Using the fundamental trigonometric relation, determine the value $\cos(A)$.

(b) From the values of sin(A) and cos(A), determine the value of tan(A).

(c) Determine the value of the angle A using your calculator and the given value of sin(A).

(d) From the value for A obtained in (13c), determine cos(A) and tan(A) using your calculator. Check that these values coincide with those obtained above.

14. Find the value of the angles in the figure and their trigonometric ratios by following these steps:

- (a) Determine the value of the trigonometric ratios for the angle A.
- (b) Determine the value of the angle A.
- (c) From the figure, deduce the value of the remaining angles B, C and D.
- (d) With the help of the figure and you answer to the previous questions, guess the trigonometric ratios for the angles B, C and D.



- 15. Solve the following triangle:
- 16. The function f has a range Range(f) = [-3, 5]. Write down the maximum and minimum value of f and determine the range of the function g in the cases listed below.

C

(a)	$f_{min} =$	$f_{max} =$		
(b)	g(x) = f(x) + 1	Range(g) = [,]
(c)	g(x) = 2f(x)	Range(g) = [,]
(d)	g(x) = 2f(x) + 1	Range(g) = [,]
(e)	g(x) = f(x-3)	Range(g) = [,]
(f)	g(x) = f(5x)	Range(g) = [,]
(g)	g(x) = f(5x - 3)) $Range(g) = [$,]

17. For the sinusoidal function $f(x) = \frac{3}{4} \sin(10x) - \frac{7}{4}$ determine:

- (a) the maximum value of $f, f_{max} =$
- (b) the minimum value of $f, f_{min} =$
- (c) the range of f, Range(f) =
- (d) the equation of the mid-point axis $y_{mid} =$
- (e) the amplitude A =
- (f) the period P =

- 18. The radioactive isotope of Uranium ^{232}U has a half-life of $t_{1/2} = 68.9 \, yrs$.
 - (a) Was is the percentage of remaining material after 100 yrs?

(b) An accident in a nuclear plant spills 200 Kg of ^{232}U into a nearby field. How much radioactive material will be remaining after 100 yrs?

19. Determine the *y*-intercept and the horizontal asymptote of the function $f(x) = 5 - 3 \cdot 2^{\frac{t}{5}}$. Check your answers by plotting it using Geogebra. Sketch a copy of that plot below.

20. You have an outstanding balance in your credit card of \$2300 that you end up paying 70 days after the due date. If the bank charges you an annual interest of 19.5%/a compounded monthly, how much do you have to pay in the end?

21. You have an oportunity to make an investment that yields 8%/a compounded semi-annually. How much would you need to invest in order to make \$10000 after 18 months?