Functions exercises set 1

1. Define function

2. Define the domain of a function

3. State the domain of the following functions:

$f(x)=\frac{}{x^2-3x-4}$

$g(x)=\frac{x}{6x-4}$

$h(x)=\frac{2x+6}{x^2+1}$

$i(x)=\sqrt{x^2-2}$

$j(x)=\log(4x-10)$

4. Find the equation of the line that passes through the points (6,4) and (-2, 1)

5. Express the line y=0.5x+8 in general form, point-gradient form and vector form.

6. find the equation of the line that is perpendicular to the one that passes through the points (9,2) and (3, 6) and contains the latter.

7. Find the equation of the line that contain all the points equidistant to (-1, 1) and (4, 6)

8. Given the functions

$k(x)=\sqrt{x}-3x$, $l(x)=\ln 2x$ and $i(x)=2x^2+3x+1$

a) find $(k\circ l)$

b) find $(l\circ k)$

c) find $(l\circ i)$

d) find $(i\circ l)$

9. A cell phone starts charging at 07:00. While being charged, the percentage of power, P , in the phone is modelled by the function $P = 100 - 60 \times a^{-t}$, where t is the number of hours after 07:00.

(a) Find the percentage of power in the phone at 07:00. [2]
The percentage of power in the phone reaches 75 % at 08:00.

(b) Find the value of a .[2]
(c) Sketch the graph of $P = 100 - 60 \times a^{-t}$

d) State a mathematical reason why the model predicts the percentage of power in the phone will never reach 100 %.[1]

10. The following graph shows the depth of water, d metres, in a river at t hours after 12:00. At 15:00, the depth of water reaches 7 m, its highest level. At 21:00, the depth of water drops to 1 m, its lowest level.
The depth can be modelled by the function d (t) = a sin (bt) + 4 .
a) find a. [1]
b) Find b [2]
c) Find the first time after 12:00 when the depth is equal to 3 m. Give your answer to the nearest minute. [3]

11. The formula F = 1.8C + 32 is used to convert a temperature in degrees Celsius, C , to degrees Fahrenheit, F .
(a) Find a formula for converting a temperature in degrees Fahrenheit to degrees Celsius.[1]
Find the temperature in degrees Celsius that is recorded as 77 degrees Fahrenheit. [2]

Answers:
3.f: $\mathbb{R}$ -{-4, 1}. g: $\mathbb{R}$ -{2/3}. h: $\mathbb{R}$. i:$(-\infty;-\sqrt{2}] \cup [\sqrt{2};\infty)$. j:$(2.5;\infty)$
4.y=3/8x+7/4
5.x-2y-16=0. y-8=0.5(x-0). (x,y)= (8,0) + λ(2,1)
6.y=3/2x+3/2
7. y=-x+5
8. a) $\sqrt{\ln(2x)} - 3\ln(2x)$ b)$\ln[2(\sqrt{x} - 3x)]$ c)$\ln[2\cdot(2x^2+3x+1)]$ d)$2(\ln(2x))^2+3\ln(2x)+1$
9. a) 40%. b) 2.4. d) Because the function has an asymptote (convergence) to 100.
10. a) 3. b) 30. c) 18:39
11. a) C= (F-32)/1.8. b) 25.