Garth of exponential functions

y = e^x

Domain: $\{x \mid x \in \mathbb{R}\}$

e^0 = 1
e^+ > 0
e^- > 0
Range: $\{y \mid y > 0\}$

1. Find the domain and range for the function y = 2^{x-1}.

2. Find the domain and range for the function y = 10^{3x}.

y = e^x

Horizontal asymptote: y = 0

No x-intercept

y-intercept = 1

1. Graph the function $y = 2^{x-1}$ without using GDC, indicate the y-intercept and horizontal asymptote.

Garth of logarithmic functions

y = $\log_{10}(x)$

when it is rearranged, 10^x = y

10 is the base
x is the power, power can be all real numbers.
y is the result, it must be positive value.

The bracket inside must be positive!

Domain: $\{x \mid x > 0\}$
Range: $\{y \mid y \in \mathbb{R}\}$

1. Find the domain and range for the function y = $\log_3(x + 10)$.

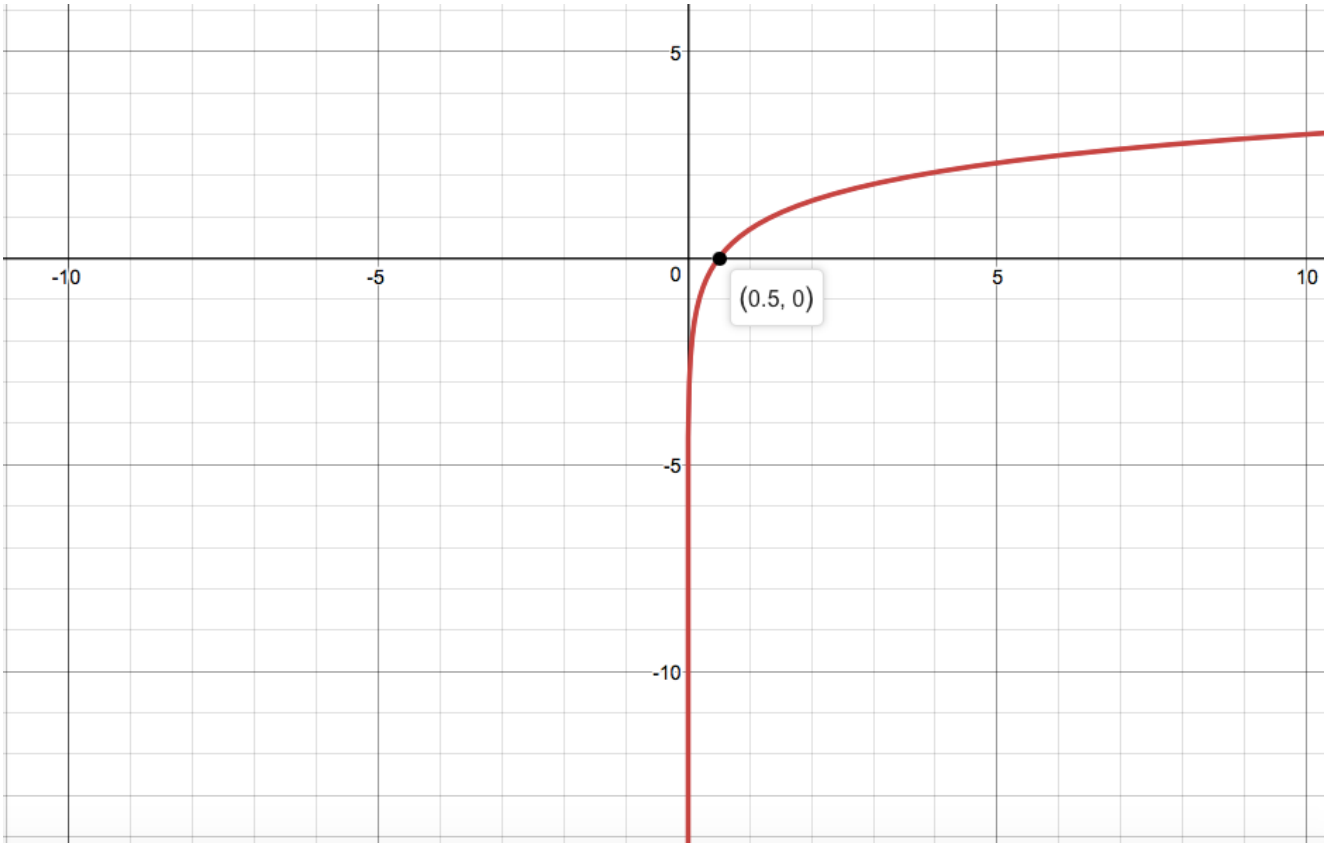
2. Find the domain and range for the function y = $\ln(2x - 4)$.

y = ln 2x

Vertical asymptote: x = 0

No y-intercept

x-intercept = 0.5



1. Graph the function y = $\log_{10}(0.5x)$ without using GDC, indicate the x-intercept and vertical asymptote.

Exercise

Paper 1

1. Let f(x) = k $\log_2 x$.

(a) Given that $f^{-1}(1)$ = 8, find the value of k.

(b) Find $f^{-1}\left(\frac{2}{3}\right)$.

Paper 2

1. A population of rate birds, P_t, can be modelled by the equation $P_t = P_0 e^{kt}$, where P_0 is the initial population, and t is measured in decades. After one decade, it is estimated that $\frac{P_1}{P_0} = 0.9$.

(a) (i) Find the value of k.

(ii) Interpret the meaning of the value of k.

(b) Find the least number of whole years for which $\frac{P_t}{P_0} < 0.75$.

2. The number of bacteria, n, in a dish, after t minutes is given by n = 800 $e^{0.13t}$.

(a) Find the value of n when t = 0.

(b) Find the rate at which n is increasing when t = 15.

(c) After k minutes, the rate of increase in n is greater than 10 000 bacteria per minute. Find the least value of k, where k ∈ $\mathbb{Z}$.