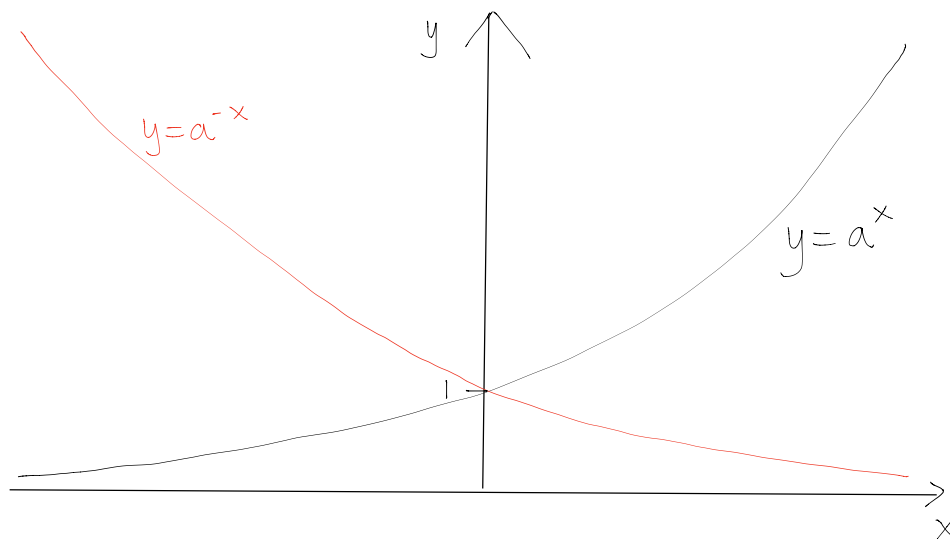


C2 - Chapter 3 - Exponentials and logarithms



Important features of the graph of $y = a^x$ ($a > 0$)

- Graph cuts the y-axis at (0,1)
- $y=0$ is a horizontal asymptote (ie the curve never touches or goes below it)
- $y > 0$ for all values of x

LAWS OF LOGARITHMS

- * $\log 1 = 0$
- * $\log_a a = 1$ for all values of a
- * $\log xy = \log x + \log y$
- * $\log\left(\frac{x}{y}\right) = \log x - \log y$
- * $\log x^k = k \log x$
- * $\log\left(\frac{1}{x}\right) = -\log x$

$$\log_{10} 100 = 2$$

$$10^2 = 100$$

The diagram shows the relationship between the logarithmic equation $\log_{10} 100 = 2$ and the exponential equation $10^2 = 100$. Red dashed boxes enclose '10' in the first equation and '100' in the second equation. Red arrows with circled numbers point from the boxed '10' in the first equation to the boxed '100' in the second equation (labeled '1'), and from the boxed '2' in the first equation to the boxed '2' in the second equation (labeled '2').

- * In the exam you would be expected to be able to solve exponential equations (ie equations where x appears as a power) and logarithmic equations. With logarithmic equations try to express everything as a single logarithm and then proceed. Avoid using the rules of logarithms wrongly, as shown in the examples below

$$\log(9-2x) = \log 9 - \log 2x$$

✗

$$3^{2x} + 3^x = 2$$

$$\log 3^{2x} + \log 3^x = \log 2$$

✗