7.1 Characteristics of Exponential Functions

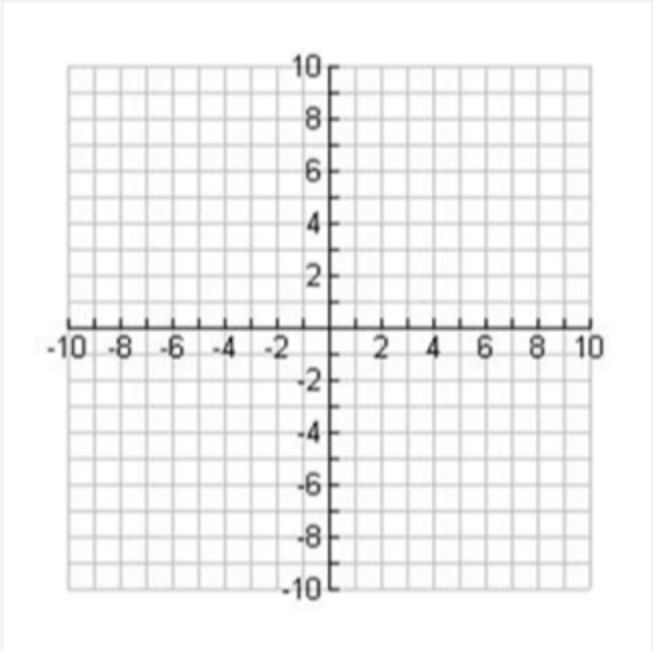
An **exponential function** can be written in the form

$y = c^x$ where $c > 0, c \neq 1$

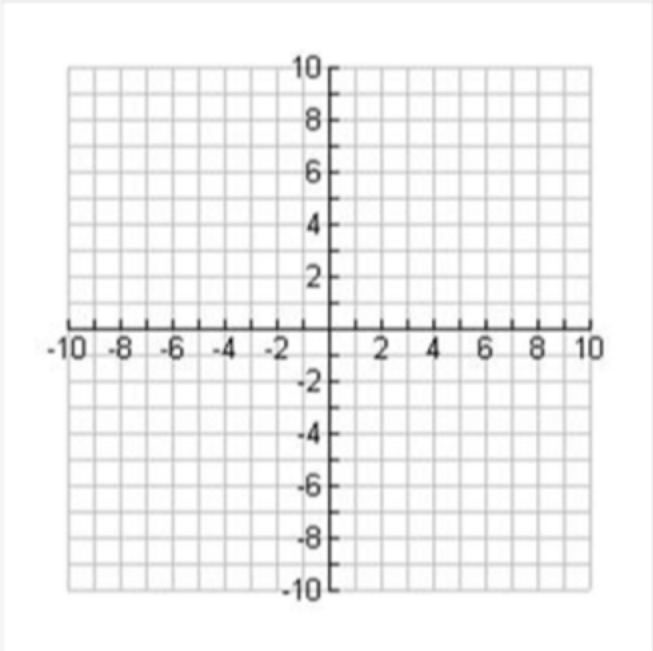
Sketch the following graphs.

i. State the domain and range
ii. State the x-intercept
iii. State the y-intercept
iv. Asymptotes

a.) $y = 2^x$



b.) $y = \left(\frac{1}{2}\right)^x$



Applications of Exponential Functions:

When $c > 1$, the function represents an **exponential growth**

Examples of exponential growths:

Doubling rate (c = 2)

Two**fold** growth (c =2)

Increase by 10% (c = 1 + 0.10 = 1.1)

When $0 < c < 1$, the function represents an **exponential decay**

Examples of exponential decay:

Half-life (c = $\frac{1}{2}$)

Decrease by 10% (c = 1 - 0.10 = 0.9)

Example 1:

A radioactive substance has a half-life of 1 day (the substance decays to half the original amount after 1 day). Plot the mass of the substance remaining if the original amount was 1 gram.

a.) Determine the domain and range.

b.) Write the exponential decay model (equation) that relates the mass of the substance.

c.) Using a graphing calculator, determine how many days it would take for the substance to decay to $1/50^{th}$ of its original mass.