

ICM Exponential Functions Worksheet #1

1. Match each graph with an equation that best represents the relationship.

i)  $y = 3^{-x}$  D

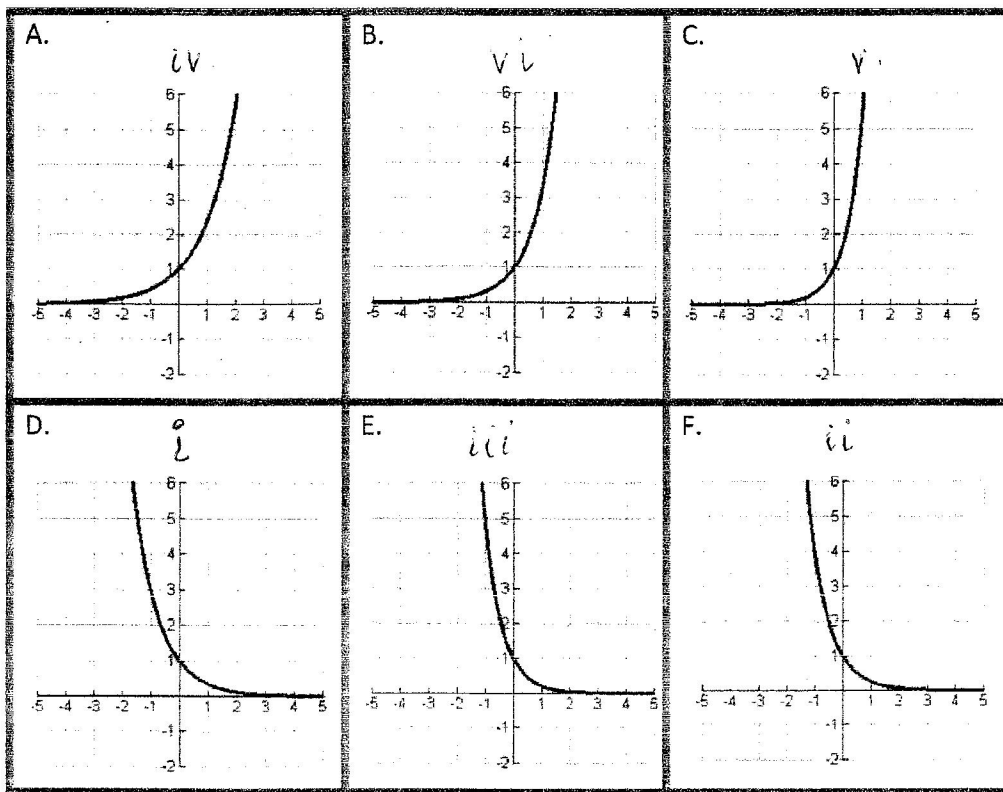
ii)  $y = \left(\frac{1}{4}\right)^x = 4^{-x}$  F

iii)  $y = 5^{-x}$  E

iv)  $y = 2.4^x$  A

v)  $y = 5.5^x$  C

vi)  $y = 3.4^x$  B



2. Match each graph with an equation that best represents the relationship.

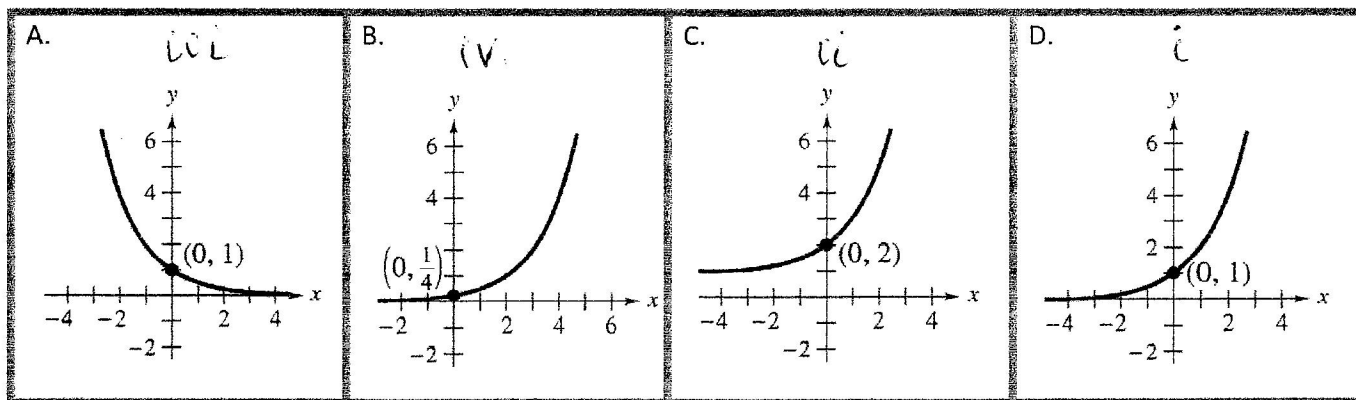
For each graph, give the domain, range, horizontal asymptote, and whether it is increasing or decreasing.

i)  $f(x) = 2^x$  D

ii)  $f(x) = 2^{x+1}$  C

iii)  $f(x) = 2^{-x}$  A

iv)  $f(x) = 2^{x-2}$  B



D:  $(-\infty, \infty)$

R:  $(0, \infty)$

h.a.  $y=0$

decreasing

D:  $(-\infty, \infty)$

R:  $(0, \infty)$

h.a.  $y=0$

increasing

D:  $(-\infty, \infty)$

R:  $(0, \infty)$

h.a.  $y=0$

increasing

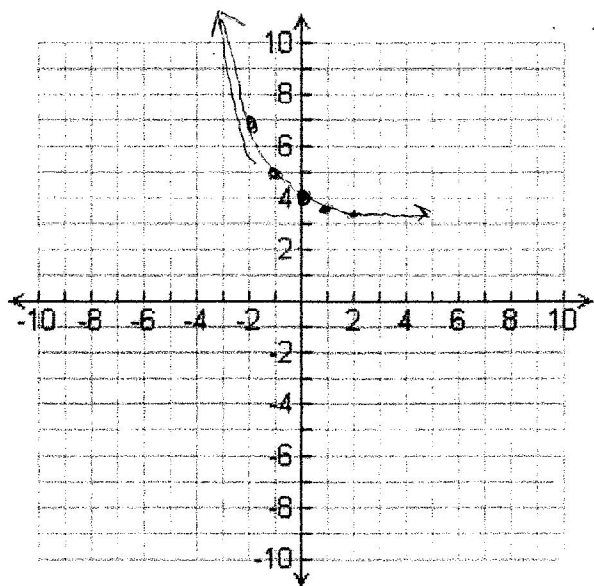
D:  $(-\infty, \infty)$

R:  $(0, \infty)$

h.a.  $y=0$

increasing

3. Graph  $f(x) = 2^{-x} + 3$ . Give the domain, range, horizontal asymptote, and whether it is increasing or decreasing. Describe the transformations on  $y = 2^x$  to obtain the graph of  $f(x)$ .



D:  $(-\infty, \infty)$   
 R:  $(3, \infty)$   
 h.a.  $y = 3$   
 decreasing

reflect over y-axis  
 shift up 3

4. Describe the transformations on  $y = 2^x$  to obtain the graph of  $f(x) = -(2^{x-3}) - 5$ . Give the domain, range, horizontal asymptote, and whether it is increasing or decreasing.

Shift rt. 3  
 reflect over x-axis  
 Shift down 5

D:  $(-\infty, \infty)$   
 R:  $(-\infty, -5)$   
 h.a.  $y = -5$   
 decreasing

5. If a single pane of glass obliterates 3% of the light passing through it, then the percent  $p$  of light that passes through  $n$  successive panes is given approximately by the equation  $p = 100e^{-0.03n}$ .

- a. What percent of light will pass through 10 panes? 74.082%
- b. What percent of light will pass through 25 panes?

47.237%

6. The atmospheric pressure  $p$  on a balloon or plane decreases with increasing height. This pressure, measured in millimeters of mercury, is related to the number of kilometers  $h$  above sea level by the formula  $p = 760e^{-0.145h}$ . Find the atmospheric pressure at a height of 2 kilometers.

568.680 mm

7. The percent  $R$  of viewers who respond to a tv commercial for a new product after  $t$  days is found by using the formula  $R = 70 - 100e^{-0.2t}$ .

- a. What percent is expected to respond after 10 days? 56.466%

- b. What is the highest percent of people expected to respond? 70%