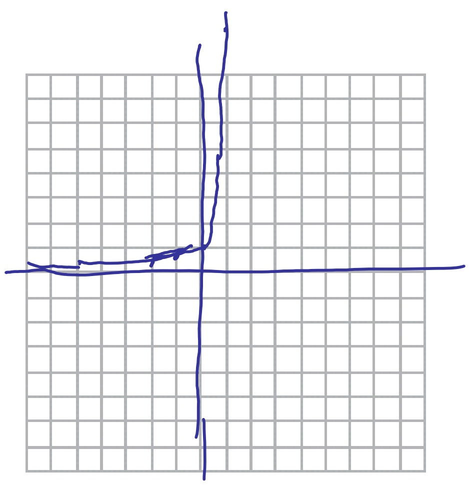
An exponential function is of the form $y = a(b)^x$ where $a \neq 0$, $b > 0$, and $b \neq 1$. The graphs of exponential function are very unique. Complete the following table of values for the indicated exponential functions and graph the functions on the grid provided.

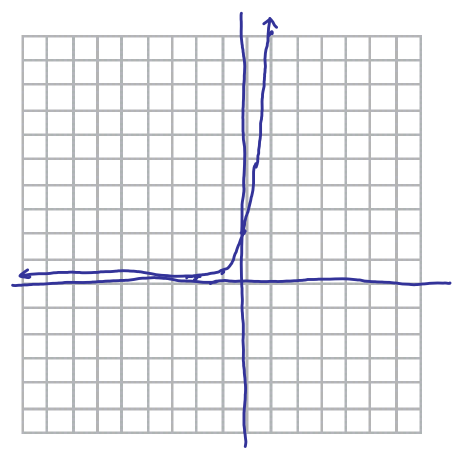
$f(x) = 10^x$

x	y	
-2	0.01	10^{-2}
-1	0.1	10^{-1}
0	1	10^0
1	10	10^1
2	100	10^2

$g(x) = 2(5)^x$

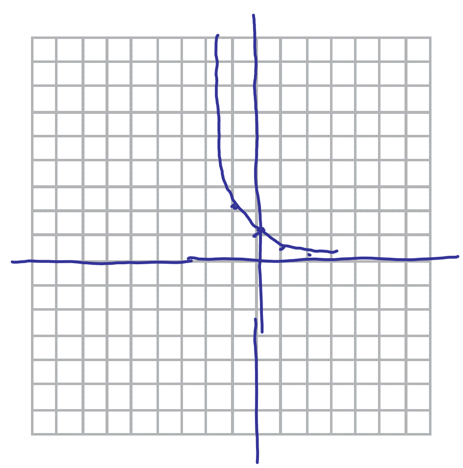
x	y
-2	0.08
-1	0.4
0	2
1	10
2	50





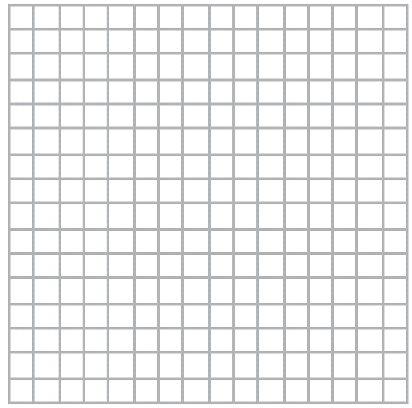
$h(x) = \left(\frac{1}{2}\right)^x$ < 1 decreasing

x	y
-2	
-1	2
0	1
1	0.5
2	0.25



$$j(x) = 8\left(\frac{1}{4}\right)^x$$

x	y
-2	
-1	
0	
1	
2	



For the above graphs, determine the number of x-intercepts, the number of y-intercepts, the end behaviour, the domain, and the range. In summary, all exponential functions written in the form $f(x) = a(b)^x$ have the following characteristics:

Number of x-intercepts	none
Number of y-intercepts	1
End Behaviour	II → I
Domain	$x \in \mathbb{R}$
Range	$y > 0$

To determine the y-intercept (ie. where the graph crosses the y-axis) we can substitute 0 for x and solve for y.

Example 1: Determine the number of x-intercepts, the y-intercept, the end behaviour, the domain, and the range of the following functions.

a) $f(x) = 2(5)^x$ >1 increasing

(b) $f(x) = 8\left(\frac{3}{4}\right)^x$ <1 decreasing

x-int = ∅

y-int.= $2(\cancel{5})^{0}$

= 2

E.B.: II → I

D: $x \in \mathbb{R}$

R: $y > 0$

y-int = $8\cancel{\left(\frac{3}{4}\right)}^{0} = 8$

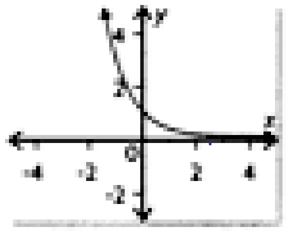
Example 2: Match each function with the corresponding graph below. Provide your reasoning.

i) $y = (3)^x$ (ii) $y = \frac{1}{3}(3)^x$ (iii) $y = 3\left(\frac{1}{3}\right)^x$ (iv) $y = \left(\frac{1}{3}\right)^x$

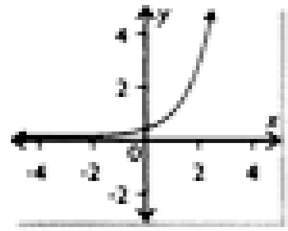
y-int = 1 y-int = 1/3 y-int = 3 y-int = 1

iv

a)



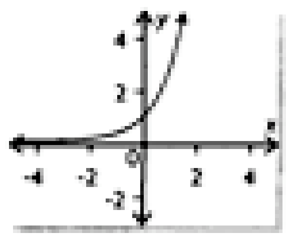
c)



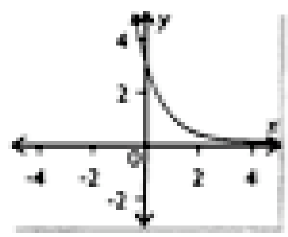
ii

i

b)



d)



iii