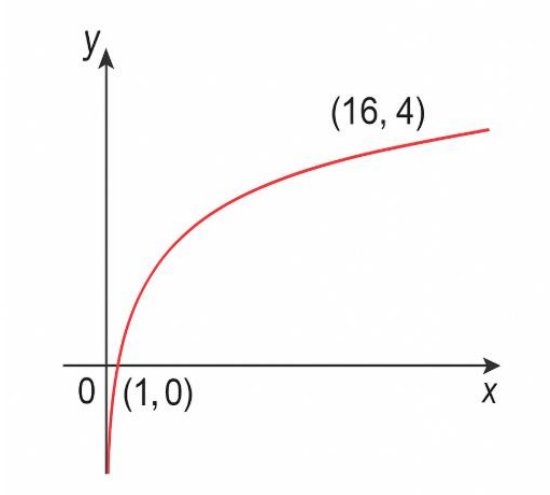
Name: …… **Date: ……**

Logarithmic Function _ Exam Style Questions

1. [Maximum mark: 6]

The sketch shows the graph of $y = log_b x$. Find the value of b.



Solution:

$y = \log_b x$

x intercept is 1

use (16, 4)

$4 = \log_b 16$

$b^4 = 16$

$b = \sqrt[4]{16}$

$\boxed{b = 2}$

2. [Maximum mark: 6]

Given that $g(x) = 5 - 3\ ln\ x$, find $g^{-1}(x)$ and state its domain.

Solution:

$f(x) = e^{2x-3} + 5 \Rightarrow y = e^{2x-3} + 5$

$g(x) = 5 - 3\ln x$

$y = 5 - 3\ln x$

To find $g^{-1}(x)$

$x = 5 - 3\ln y$

$3\ln y = 5 - x$

$\ln y = \frac{5-x}{3}$

$y = e^{\frac{5-x}{3}}$

$\therefore g^{-1}(x) = e^{\frac{5-x}{3}}$

Domain of $g^{-1}(x)$ = range of $g(x)$

Since $\ln x$ takes all real values for $x > 0$, Domain of $g^{-1}(x)$ is $(-\infty, \infty)$

3. [Maximum mark: 6]

Given that $f(x) = e^{2x-3} + 5$ find $f^{-1}(x)$ and state its domain.

Solution:

$f(x) = e^{2x-3} + 5 \Rightarrow y = e^{2x-3} + 5$

To find $f^{-1}(x)$, Swap x and y

$x = e^{2y-3} + 5$

$x - 5 = e^{2y-3}$

$\ln(x-5) = 2y - 3$

$2y - 3 = \ln(x-5)$

$2y = \ln(x-5) + 3$

$y = \frac{\ln(x-5)+3}{2}$

$f^{-1}(x) = \frac{\ln(x-5)+3}{2}$

Domain of $f^{-1}(x)$ is $(5, \infty)$.