October 15, 2010

Note Title 10/15/2010

Example

$g(x) = \log_b(5-2x)$

Domain:

$5 - 2x > 0$

$-2x > -5$

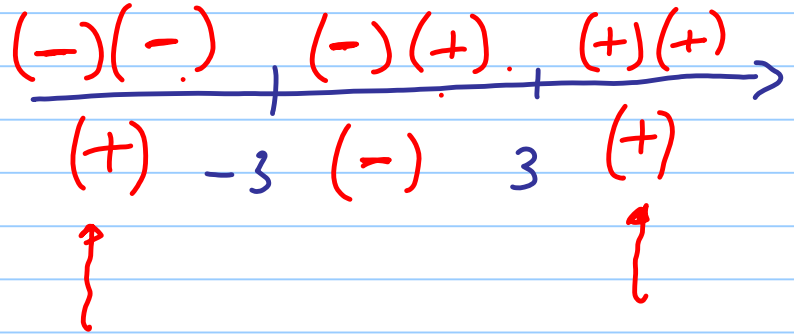
$x < \frac{-5}{-2}$ $\quad \left(-\infty, +\frac{5}{2}\right)$

Example

d) $\ln(x^2-9)$

Domain: $x^2-9>0$

$(x-3)(x+3)>0$



Domain: $(-\infty,-3)\cup(3,\infty)$

Example

$\log|x+1|$ Domain: $|x+1| > 0$

absolute value always non negative!

$x+1 \neq 0$

$\boxed{x \neq -1}$

$(-\infty, -1) \cup (-1, \infty)$

Example

Graph the functions and state the domain and range.

a) $y = \log_2(x-3)$

Use transformations.

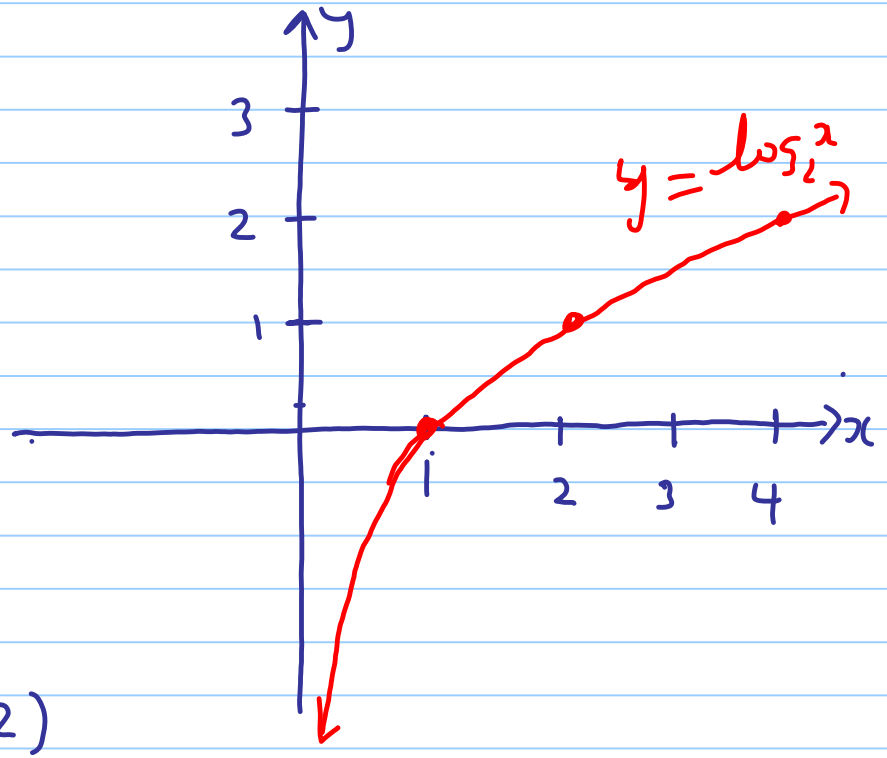
Start with base function

$y = \log_2 x$

x-intercept: $(1, 0)$

vertical asymptote: $x = 0$

Additional points: $(2, 1)$, $(4, 2)$

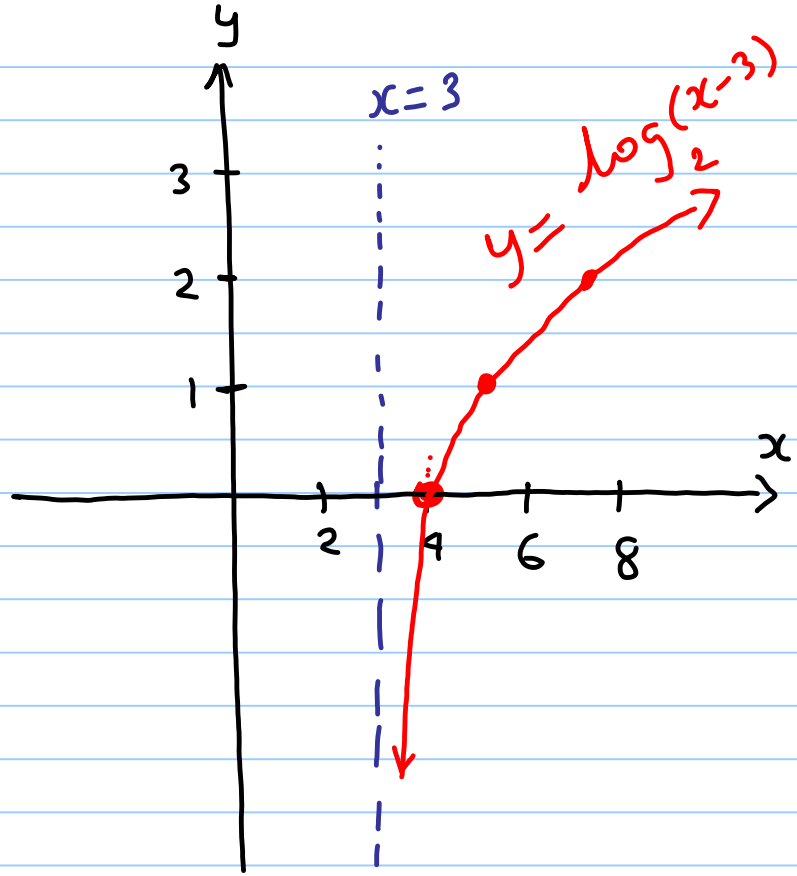


$y = \log_2^2 \iff 2^y = 2^1$

$y = \log_2(x-3)$

Horizontal shift 3 units right

- x-intercept $(4, 0)$
- vertical asymptote : $x = 3$
- Additional points : $(5, 1)$, $(7, 2)$



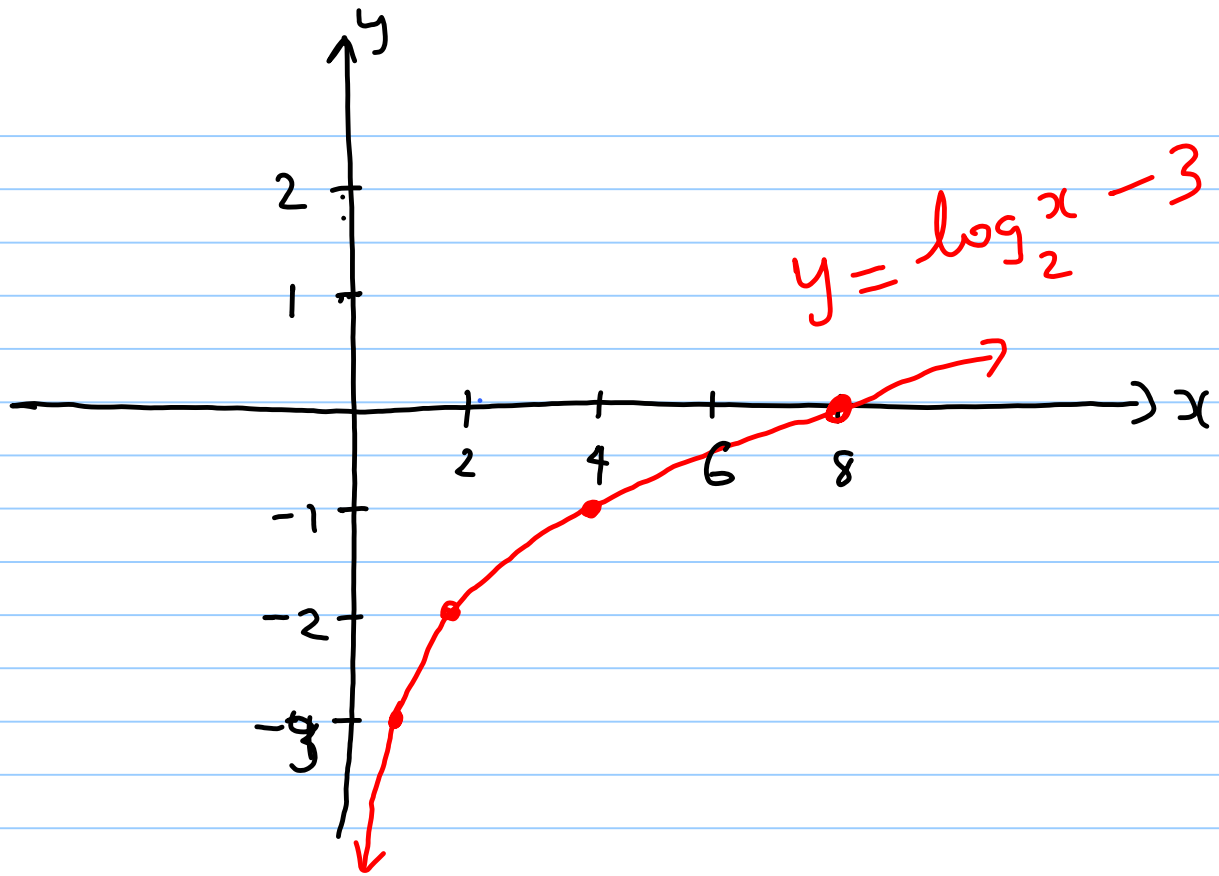
b) $y = \log_2(x) - 3$

base: $y = \log_2 x$

vertical shift down 3 units.

- x-intercept of base function moves to $(1, -3)$.
- x-intercept: $\log_2 x - 3 = 0 \quad \log_2 x = 3 \quad x = 2^3 \quad (8, 0)$

- vertical asymptote: $x = 0$
- Additional points: $(2, -2), (4, -1)$


y
x
2
1
-1
-2
-3
2
4
6
8
$y = \log_2 x - 3$

Example

$$f(x) = -\log_2(x-3)$$

base function $y = \log_2 x$

$y = \log_2(x-3)$

Horizontal shift 3 units right

$y = -\log_2(x-3)$

Reflection on the x-axis