1, 2, 3, −7

$\boxed{f \text{ (SQUARE!)}}$

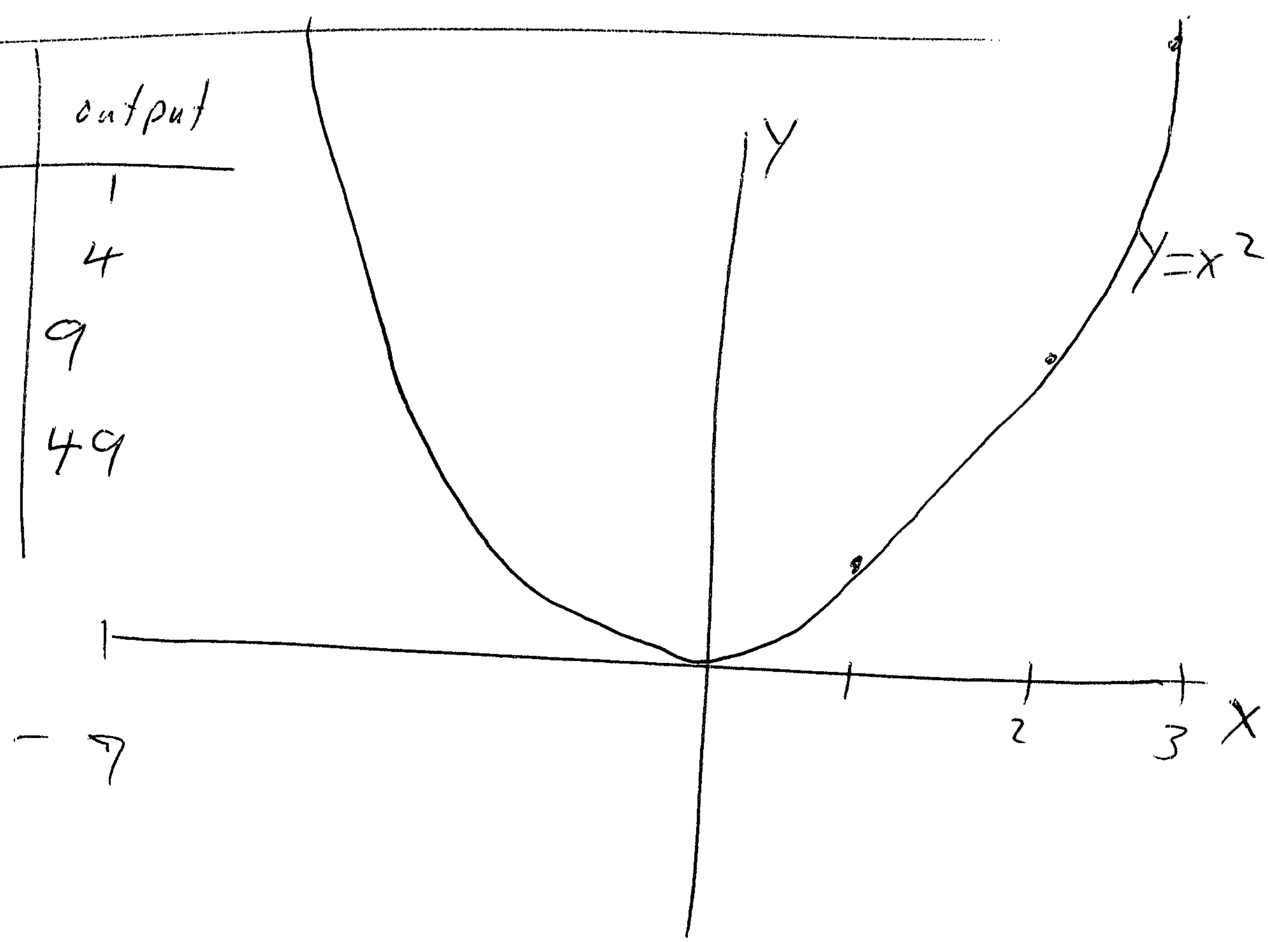
1, 4, 9, 49

$f(x) = x^2$

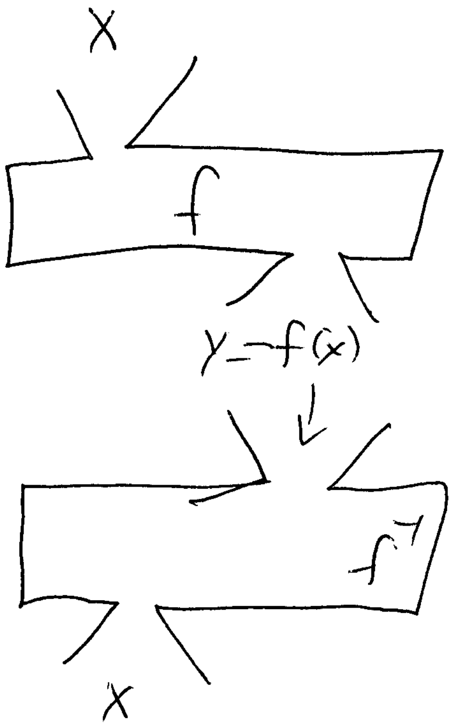
$f(y) = y^2$

$f(z) = z^2$

input	output
1	1
2	4
3	9
−7	49
⋮	



Def: f^{-1} is f run backwards



$$y = f(x)$$

$$x = f^{-1}(y)$$

$$f^{-1}(y) \neq \frac{1}{f(y)} = (f(y))^{-1}$$

$f(x) = x+1 = y$

$y = x+1 = f(x)$

$x = y-1 = f^{-1}(y)$

$f^{-1}(y) = y-1$

$\left(f^{-1}(x) = x-1\right)$

x	$f(x)$
1	2
2	3
3	4
4	5
5	6

y	$f^{-1}(y)$
2	1
3	2
4	3
5	4
6	5

$f(x) = 2x = y$

$y = 2x = f(x)$

$x = y/2 = f^{-1}(y)$

$f^{-1}(x) = x/2$

$f(f^{-1}(x)) = f^{-1}(f(x)) = x$

$f(x) = 3x + 7$

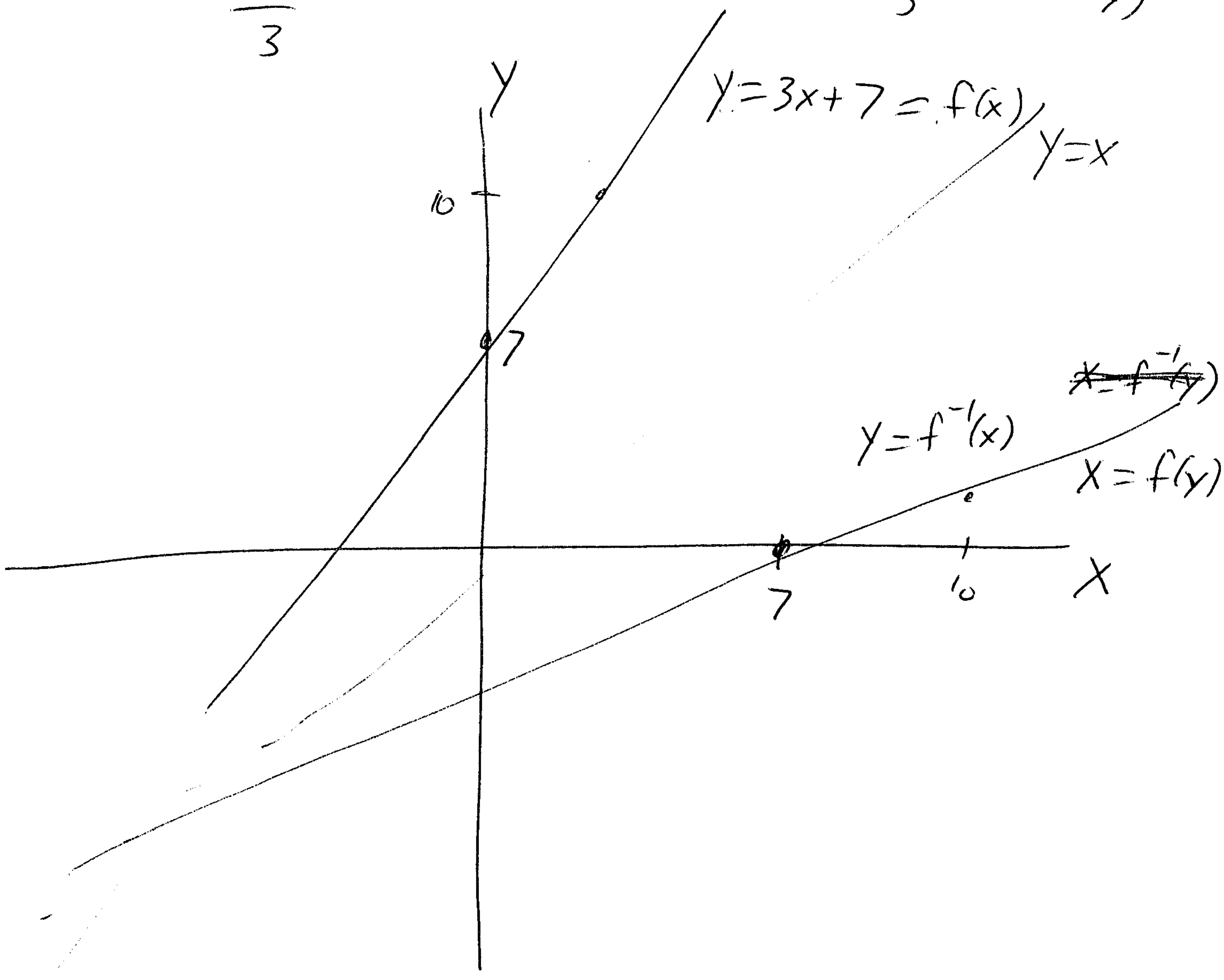
$3x + 7 = y = f(x)$

$f^{-1}(x) = \frac{x-7}{3}$

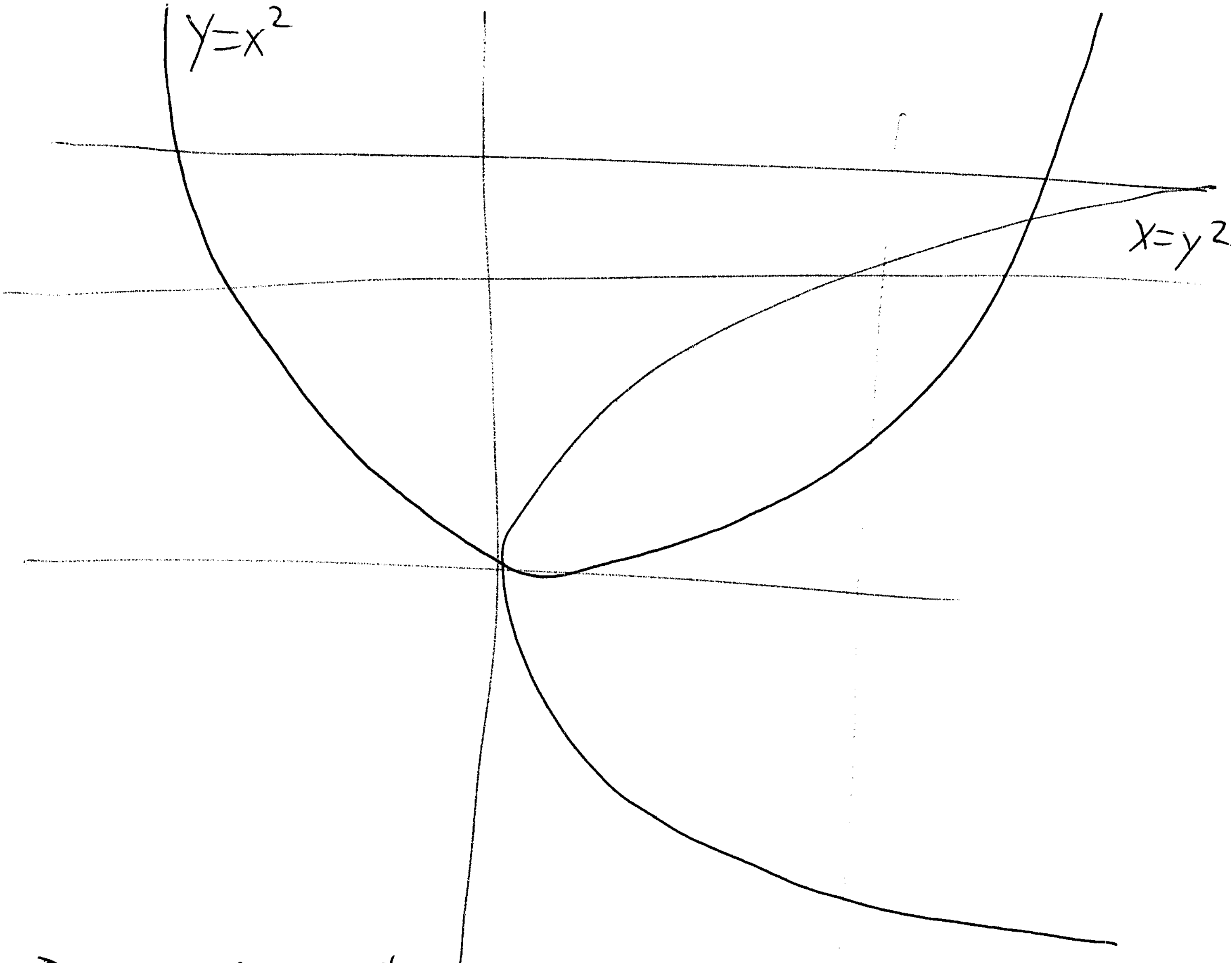
$3x = y - 7$

$f^{-1}(y) = \frac{y-7}{3}$

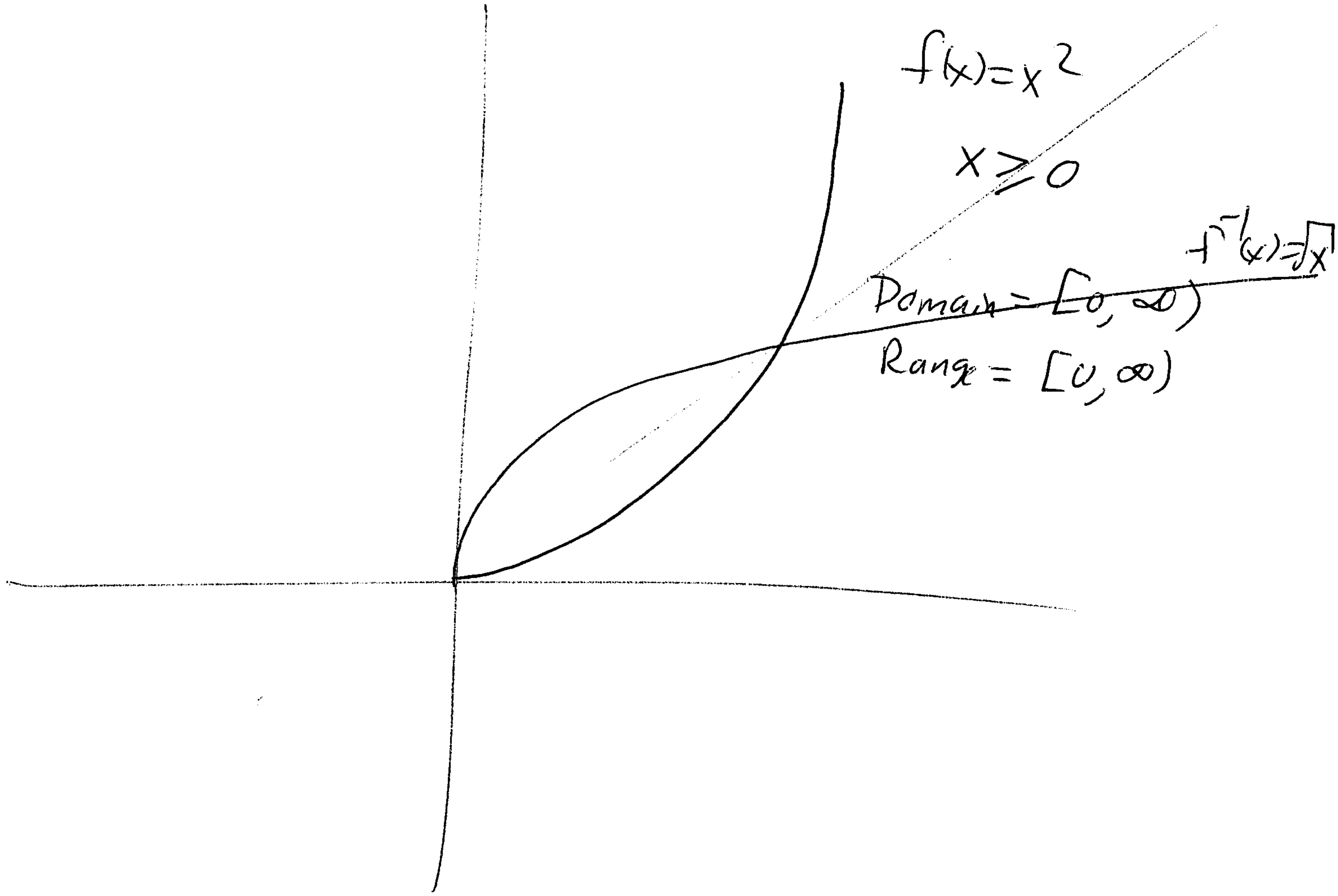
$x = \frac{y-7}{3} = f^{-1}(y)$



$f(x)=x^2$



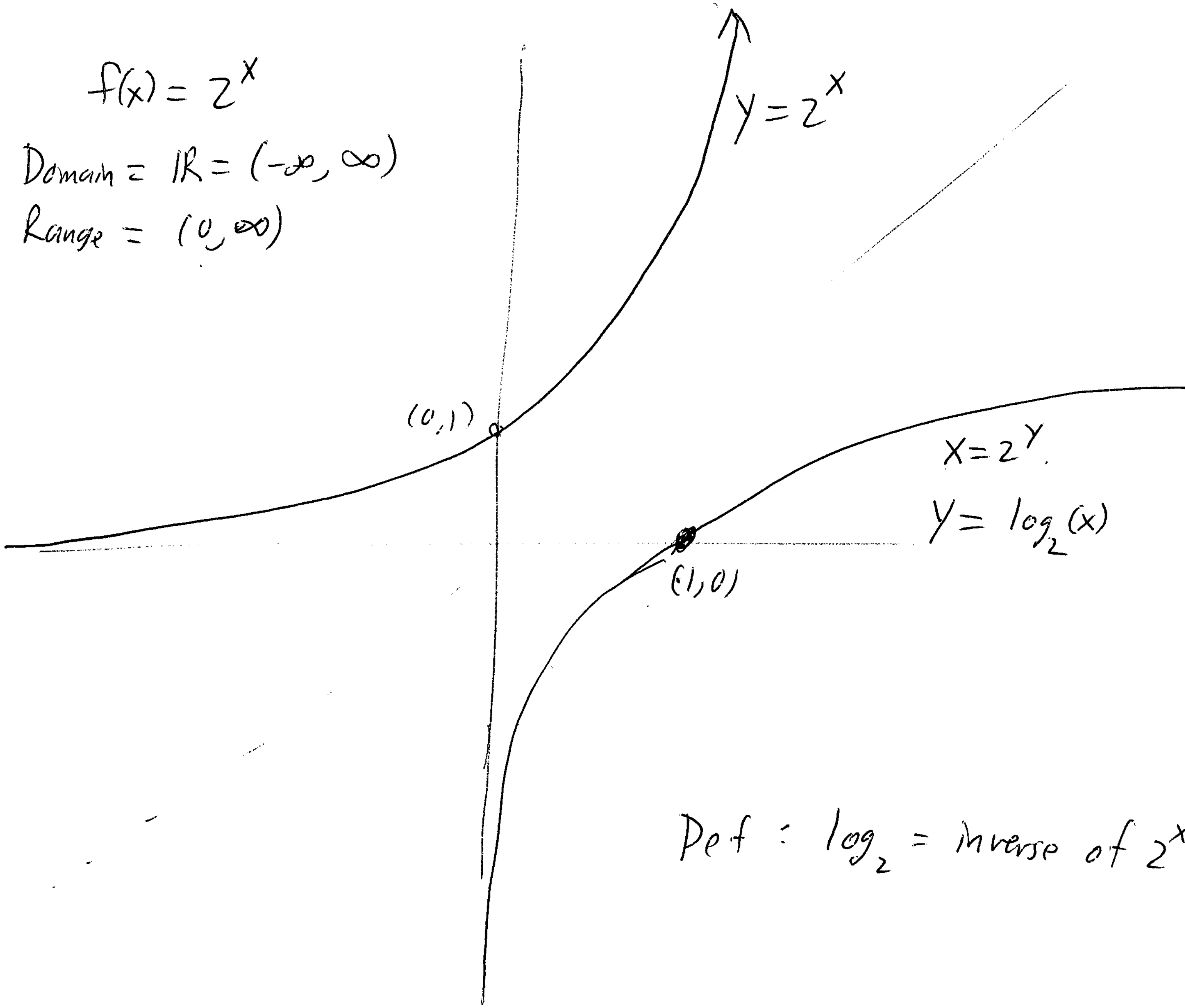
Domain of f^{-1} = Range of f


f(x)=x^2
x ≥ 0
f^-1(x)=√x
Domain = [0, ∞)
Range = [0, ∞)

$f(x) = 2^x$

Domain $= \mathbb{R} = (-\infty, \infty)$

Range $= (0, \infty)$



Def : $\log_2$ = inverse of 2^x

x	2^x
-1	$\frac{1}{2}$
0	1
1	2
2	4
3	8
4	16
10	1024

x	$\log_2 x$
$\frac{1}{2}$	-1
1	0
2	1
8	3
1024	10

$$2^{10} = 1024 \iff \log_2(1024) = 10$$

$$a^x a^y = a^{x+y} \iff \log_a(xy) = \log_a(x) + \log_a(y)$$

$$\frac{a^x}{a^y} = a^{x-y} \iff \log_a\left(\frac{x}{y}\right) = \log_a(x) - \log_a(y)$$

$$(a^x)^r = a^{rx} \iff \log_a(x^r) = r\log_a(x)$$

$$b = \log_a(x) \qquad c = \log_a(y)$$

$$x = a^b \qquad y = a^c$$

$$xy = a^b a^c = a^{b+c}$$

$$\log_a(xy) = b+c = \log_a(x) + \log_a(y)$$

$$\frac{x}{y} = \frac{a^b}{a^c} = a^{b-c}$$

$$\log_a\left(\frac{x}{y}\right) = b-c = \log_a(x) - \log_a(y)$$

$$x^r = (a^b)^r = a^{br}$$

$$\log_a(x^r) = br = r\log_a(x)$$

$$\log_2\left(4^{x^2-7}\right) = (x^2-7)\log_2(4) = 2(x^2-7)$$

$$\log_4 \cancel{(x^2-7)} \left(4^{x^2-7}\right) = x^2-7$$

$$\log_2(x) = 2\log_4(x)$$

$$\boxed{\log_a(x) = \log_a(b)\,\log_b(x)}$$

$$\log_2(4) = 2$$

$$\log_2(8) = 3$$

$$\log_2(x) = 2\log_4(x)$$

$$\log_2(x) = 3\log_8(x)$$

$$\log_8\left(4^{x^2-7}\right) = \frac{2}{3}(x^2-7)$$

$$\log_8(x) = \frac{1}{3}\log_2(x)$$

$$\boxed{\log_a(x) = \frac{\log_b(x)}{\log_b(a)}}$$

$$\log_b(a) = \frac{1}{\log_a(b)}$$

$$\log_2(1000) \approx 10$$

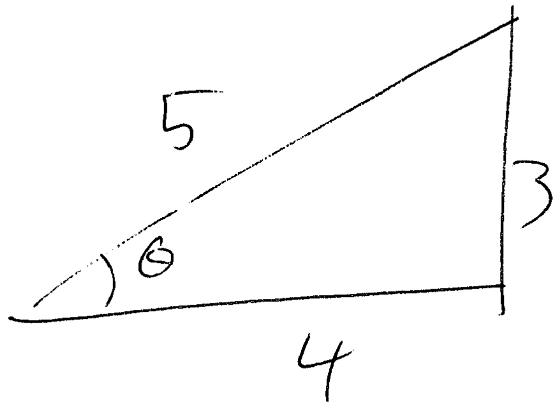
$$\log_{10}(1000) = 3$$

$$\log_2(10) \approx \frac{10}{3}$$

$$\log_{10}(2) \approx \frac{3}{10}$$

$$\ln(x) \stackrel{\text{def}}{=} \log_e(x)$$

$$\log_a(x) = \frac{\ln(x)}{\ln(a)} = \frac{\log_{10}(x)}{\log_{10}(a)} = \frac{\log_2(x)}{\log_2(a)}$$



$$\sin\theta = \frac{3}{5}$$

$$\theta = \sin^{-1}\left(\frac{3}{5}\right)$$

$$\theta = \cos^{-1}\left(\frac{4}{5}\right)$$

$$\theta = \tan^{-1}\left(\frac{3}{4}\right)$$