

Homework 3.2: Graphing Logs & Exponents

Math 3

Name: Key!

Find the inverse of the following.

1. $y = 3^x - 12$

2. $y = \log_4(x-1)$

3. $y = \log_2(x) - 7$

4. $y = \log_4(x+6) + 3$

$3^y - 12 = x$
 $3^y = x + 12$

$\log_4(y-1) = x$
 $4^x = y-1$
 $4^x + 1 = y$

$\log_2(y) - 7 = x$
 $\log_2(y) = x + 7$
 $2^{x+7} = y$

$\log_4(y+6) + 3 = x$
 $\log_4(y+6) = x - 3$
 $4^{x-3} = y+6$

$\log_3(x+12) = y$

$f^{-1}(x) = \log_3(x+12)$

$f^{-1}(x) = 4^x + 1$

$f^{-1}(x) = 2^{x+7}$

$f^{-1}(x) = 4^{x-3} - 6$

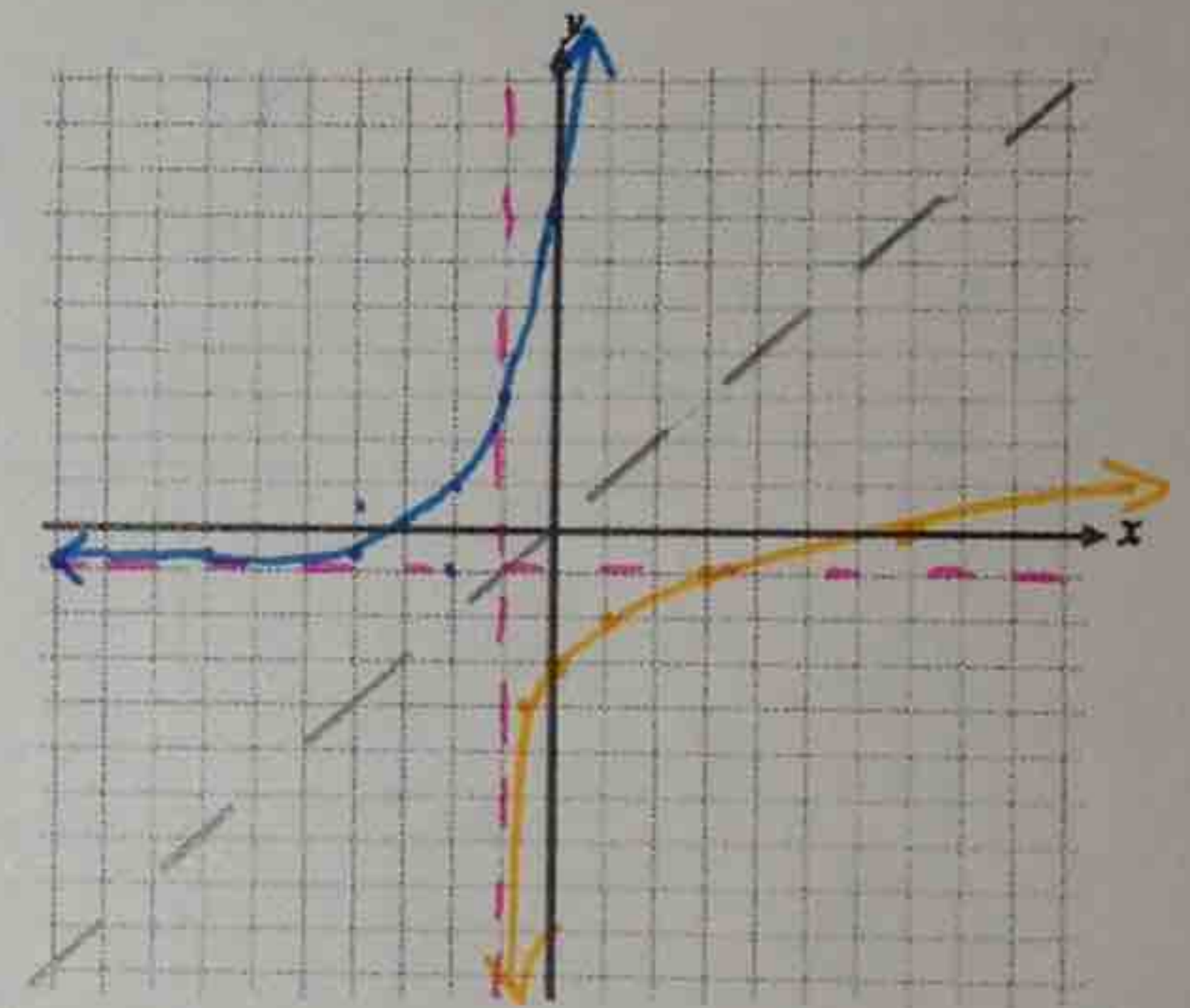
5. $y = 2^{x+3} - 1$

$f^{-1}(x) = \log_2(x+1) - 3$

x	f(x)
-4	-0.5
-3	0
-2	1
-1	3
0	7

x	f ⁻¹ (x)
-0.5	-4
0	-3
1	-2
3	-1
7	0

$2^{y+3} - 1 = x$
 $2^{y+3} = x + 1$
 $\log_2(x+1) = y+3$
 $\log_2(x+1) - 3 = y$



Transformations:

L3, D1
L1, D3

Asymptote:

$y = -1$
 $x = -1$

Domain:

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

Range:

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

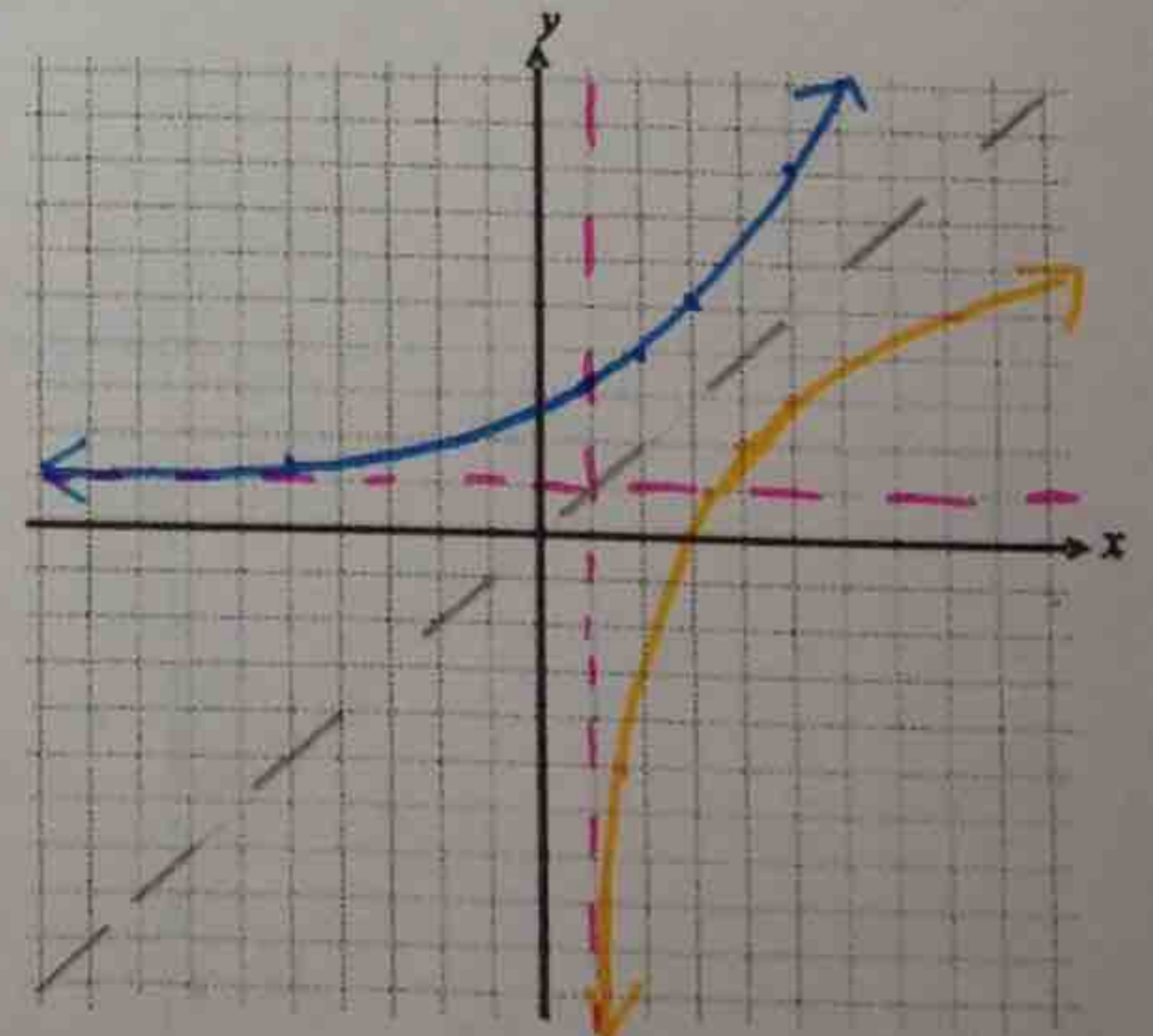
6. $y = 3\left(\frac{4}{3}\right)^{x-2} + 1$

$f^{-1}(x) = \log_{\frac{4}{3}}\left(\frac{x-1}{3}\right) + 2$

x	f(x)
-5	1.4
1	3.25
2	4
3	5
5	8.1

x	f ⁻¹ (x)
1.4	-5
3.25	1
4	2
5	3
8.1	5

$3\left(\frac{4}{3}\right)^{y-2} + 1 = x$
 $3\left(\frac{4}{3}\right)^{y-2} = x - 1$
 $\left(\frac{4}{3}\right)^{y-2} = \frac{x-1}{3}$
 $\log_{\frac{4}{3}}\left(\frac{x-1}{3}\right) = y - 2$
 $\log_{\frac{4}{3}}\left(\frac{x-1}{3}\right) + 2 = y$



Transformations:

V. stretch, R2, U1
H. stretch, R1, U2

Asymptote:

$y = 1$
 $x = 1$

Domain:

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

Range:

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

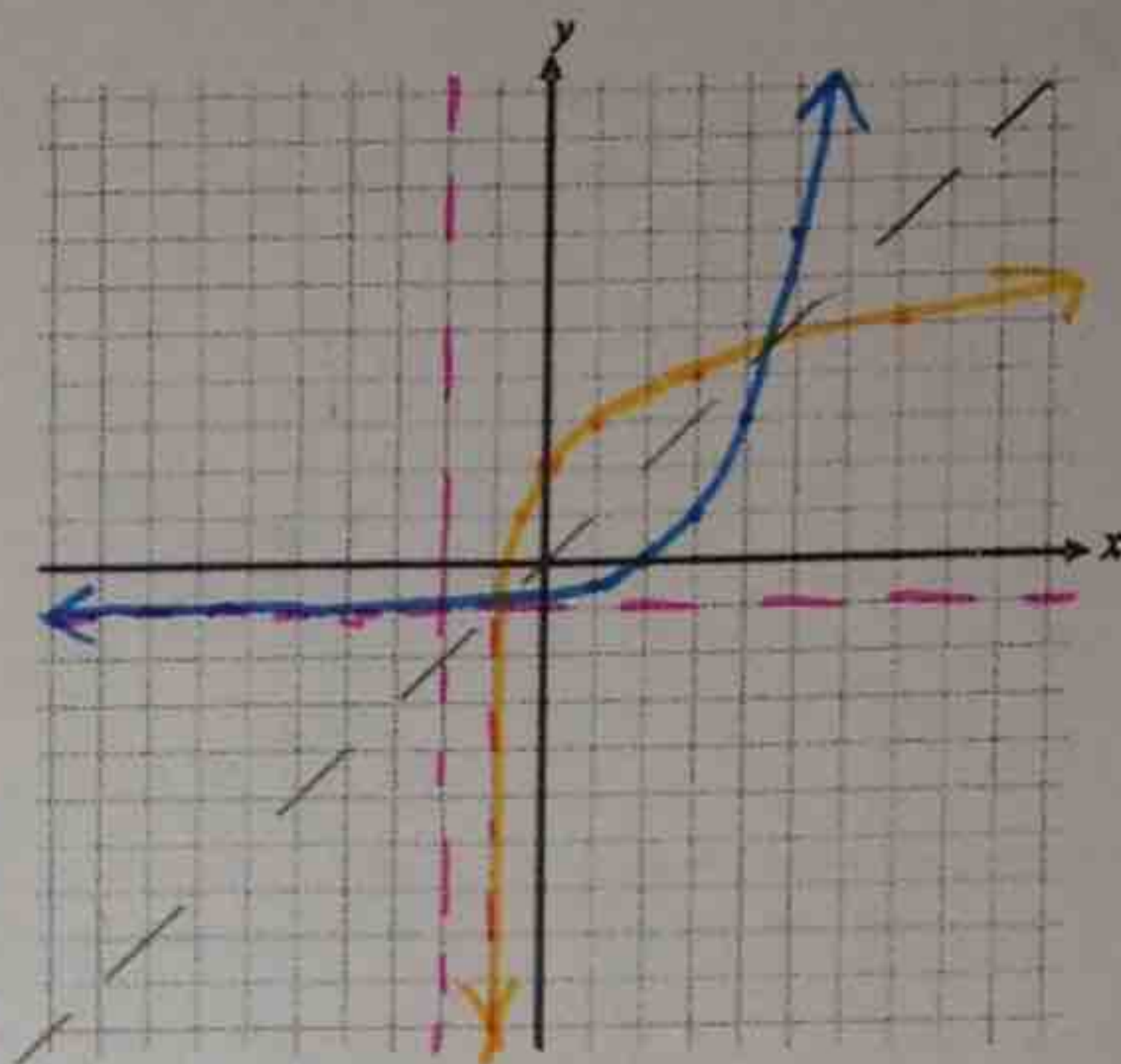
7. $y = \log_2(x+1)+2$

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

x	f(x)
0	2
1	3
3	4
7	5

x	f ⁻¹ (x)
1	-0.5
2	0
3	1
4	3
5	7

$\log_2(y+1)+2 = x$
 $\log_2(y+1) = x-2$
 $2^{x-2} = y+1$
 $2^{x-2} - 1 = y$



Transformations:

L1, U2
R2, D1

Asymptote:

x = -1
y = -1

Domain:

(-1, ∞)
(-∞, ∞)

Range:

(-∞, ∞)
(-1, ∞)

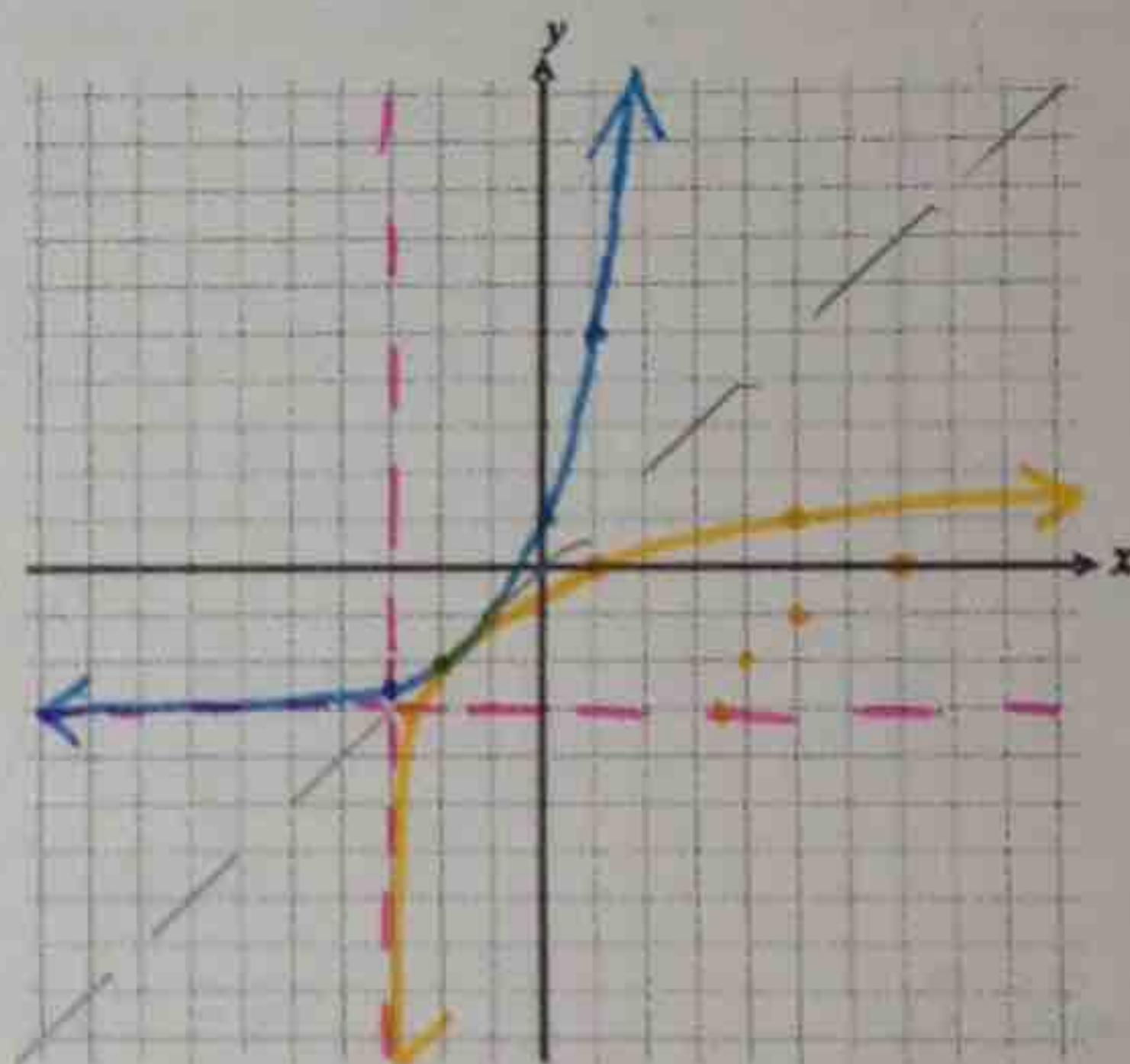
8. $y = \log_2(x+3)-2$

$f^{-1}(x) = 2^{x+2} - 3$

x	f(x)
-2.5	-3
-2	-2
-1	-1
1	0
5	1

x	f ⁻¹ (x)
-3	-2.5
-2	-2
-1	-1
0	1
1	5

$\log_2(y+3)-2 = x$
 $\log_2(y+3) = x+2$
 $2^{x+2} = y+3$
 $2^{x+2} - 3 = y$



Transformations:

L3, D2
D3, L2

Asymptote:

x = -3
y = -3

Domain:

(-3, ∞)
(-∞, ∞)

Range:

(-∞, ∞)
(-3, ∞)

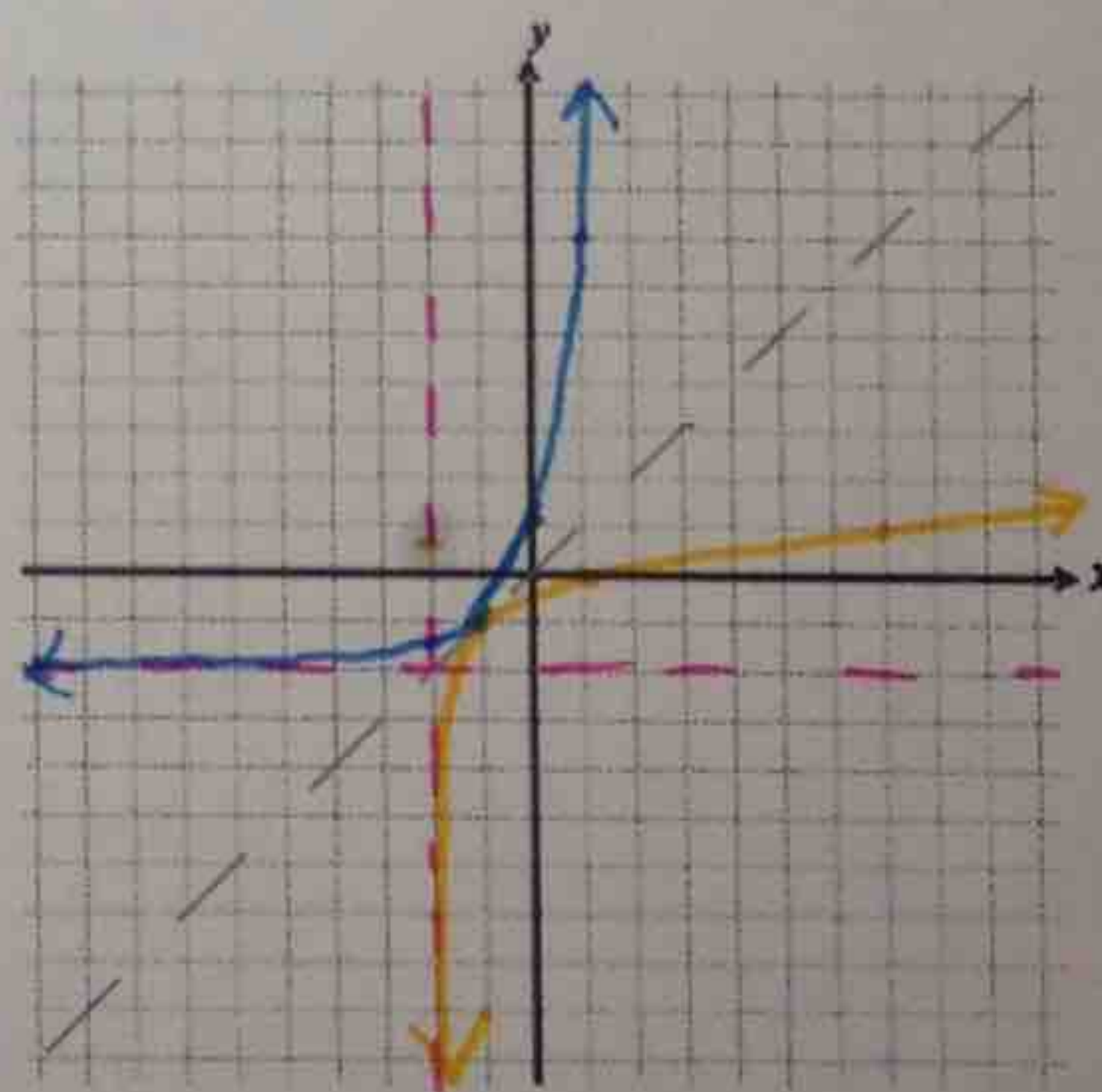
9. $y = -1 + \log_3(x+2)$

$f^{-1}(x) = 3^{x+1} - 2$

x	f(x)
-1	-1
1	0
7	1

x	f ⁻¹ (x)
-1	-1
0	1
1	7

$\log_3(y+2)-1 = x$
 $\log_3(y+2) = x+1$
 $3^{x+1} = y+2$
 $3^{x+1} - 2 = y$



Transformations:

L2, D1
D2, L1

Asymptote:

x = -2
y = -2

Domain:

(-2, ∞)
(-∞, ∞)

Range:

(-∞, ∞)
(-2, ∞)