

G11

Today:

- Test 6 - solution
- Paper2: Calculator

T1 N-spire> How to use it in the
website

① Q1, a

$$f(x) = \log_3 \sqrt{x}$$

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

$$x = \log_3 \sqrt{y}$$

$$\begin{aligned} (3^x)^2 &= (\sqrt{y})^2 \\ 3^{2x} &= y \end{aligned}$$

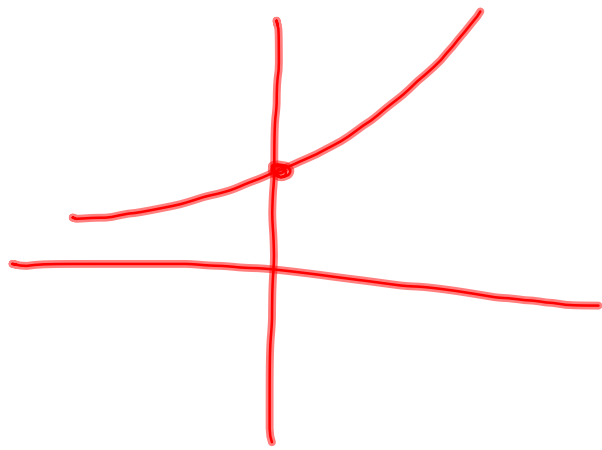
$$\begin{aligned} (\sqrt{y})^2 &= (3^x)^2 \\ y &= 3^{2x} \end{aligned}$$

range

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

$$\{y \mid y > 0\}$$

$$y > 0$$



$$(f^{-1} \circ g)(2)$$

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

$$f^{-1}(g(2))$$

$$g(2) = \log_3 2$$

$$f^{-1}(\log_3 2) = 3^{2(\log_3 2)}$$

$$= 3^{2 \log_3 2}$$

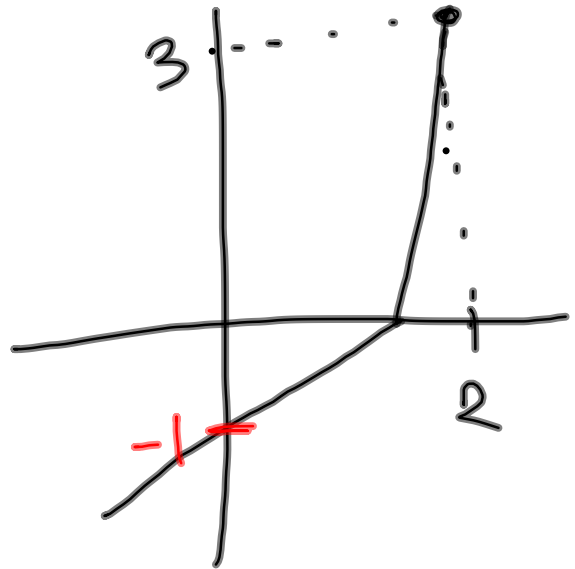
$$= 3^{\log_3 2^2}$$

$$= 2^2 = 4$$

a)

$$f(2) = 3$$

find y value
when $x = 2$



b)

$$f^{-1}(-1) = 0$$

y value of
 $f(x)$

$f(x)$

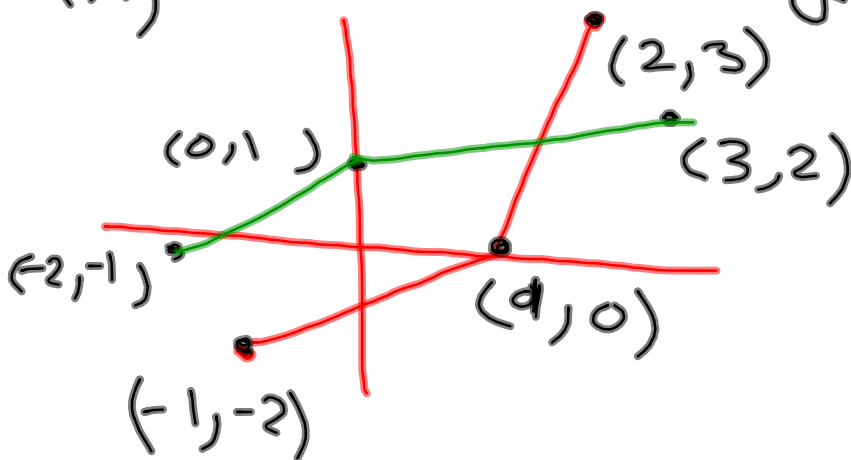
$$x = 0$$

$$y = -1$$

$f^{-1}(x)$

$$y = 0$$

$$x = -1$$



$$f(x) = (x-1)^2 - 9$$

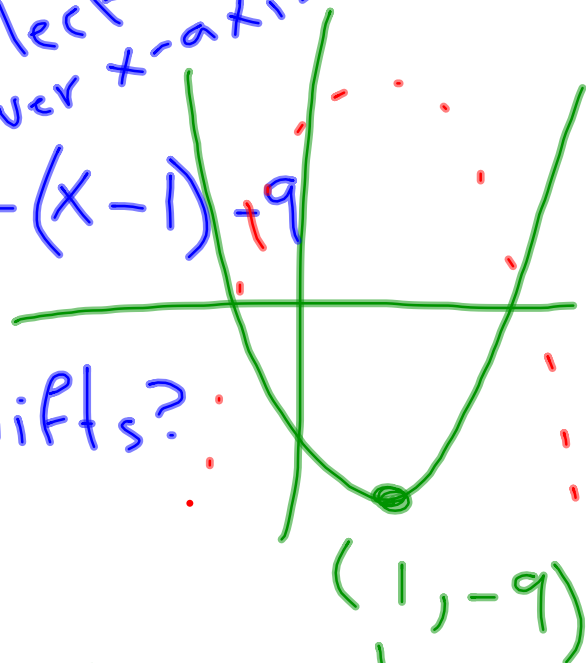
$$h = 1$$

$$k = -9$$

reflect
over x-axis

$$K(x) = -(x-1)^2 + 9$$

shifts?



$$g(x) = -(x-3)^2 + 1$$

$$h: 1 \rightarrow 3$$

$$k: +9 \rightarrow 1$$

2 units right h, k

8 down

$$p = 2$$

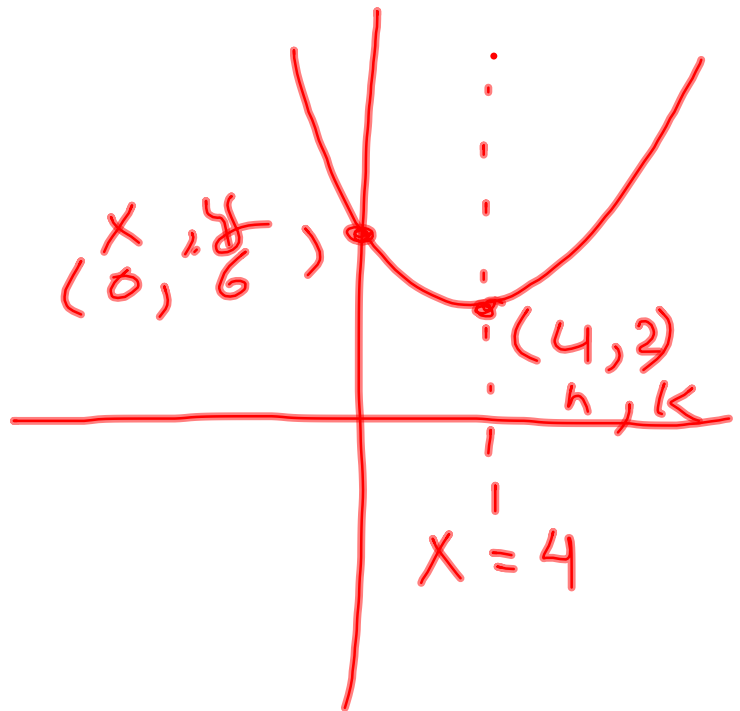
$$q = -8$$

4a

$$x = 4$$

$$h = 4$$

$$k = 2$$



c) $y = a(x - h)^2 + k$

$$6 = a(0 - 4)^2 + 2$$

$$6 = a(16) + 2$$

$$4 = 16a$$

$$a = \frac{1}{4}$$

$$\begin{matrix} h & k \\ (4, & 2) \end{matrix}$$

$$\begin{matrix} x & y \\ (0, & 6) \end{matrix}$$

$$f(x) = p + \frac{q}{x-q}, \quad x \neq q$$

VA: $x = 3$

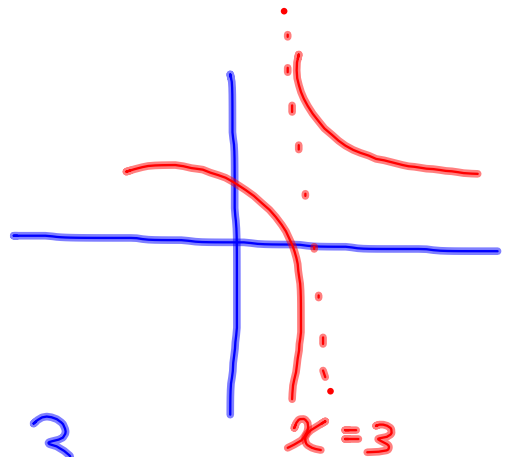
VA:

$$x - q = 0$$

$$x = q$$

$$x = 3$$

$$\therefore q = 3$$



$$Y_{\text{int}} = (0, 4)$$

$$y = p + \frac{q}{x-q}$$

$$q = 3$$

$$4 = p + \frac{q}{0-3}$$

$$x = 0 \quad y = 4 \quad (0, 4)$$

$$4 = p - 3$$

$$\boxed{p = 7}$$

5c

$$y = 7 + \frac{9}{x-3}$$

HA:

set

$$x = 1000000$$

$$y = 7$$

6a

$$f(x) = e^{x+3}$$

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

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

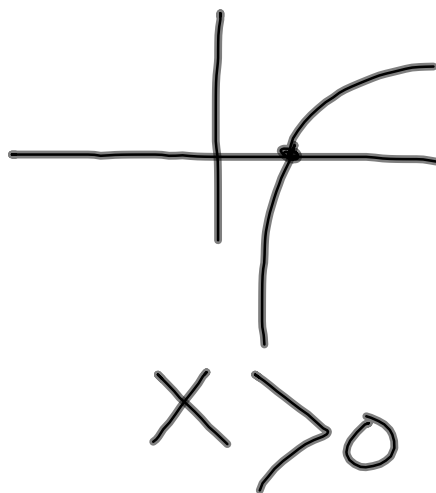
$$y = e^{x+3}$$

$f^{-1}(x)$

$$\ln x = \ln e^{y+3}$$

$$\ln x = y + 3$$

$$\ln x - 3 = y$$



6b

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

$$\therefore \ln \frac{1}{x} = -(\ln x - 3)$$

$$\ln \frac{1}{x} = \ln x - \ln e^3$$

$$\ln \left(\frac{1}{x} \right) = \ln \left(\frac{x}{e^3} \right)$$

$$\frac{1}{x} = \frac{x}{e^3}$$

$$\therefore \sqrt{x^2} = \sqrt{e^3}$$

$$x = \sqrt{e^3}$$

$$\therefore \boxed{x = e^{\frac{3}{2}}}$$

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$$x^2 - 3x + k^2 = 4.$$

$$x^2 - 3x + k^2 - 4 = 0$$

$$a = 1$$

$$b = -3$$

$$c = k^2 - 4$$

$$\Delta > 0$$

$$b^2 - 4ac > 0$$

$$(-3)^2 - 4(1)(k^2 - 4) > 0$$

$$x^2 + x + k = 2x + 3$$

$$x^2 - x + (k - 3) = 0$$

$$9 - 4k^2 + 16 > 0$$

$$-4k^2 + 25 > 0$$

divide by -1 both sides

$$4k^2 - 25 < 0$$

$$(2k - 5)(2k + 5) < 0$$

$$2k - 5 < 0 \quad \text{or} \quad 2k + 5 < 0$$

$$k < 2.5 \quad k > -2.5$$

Therefore:

$$-2.5 < k < 2.5$$

$$f^{-1}(5) = -1$$

$$f(-1) = 2$$

$$f(2) = 1$$

