$$g(x) = 7\cdot 3^{5x+2} - 11$$

in terms of $f(x) = 3^x$

$$7f(5x+2) - 11$$

The 5 makes it tougher, but we're strong.

My approach: $5x+2 = 5(x+\frac{2}{5})$

$$7\cdot f\left(5\left(x+\tfrac{2}{5}\right)\right) - 11$$

1 $(x,y)\to(x,7y)$

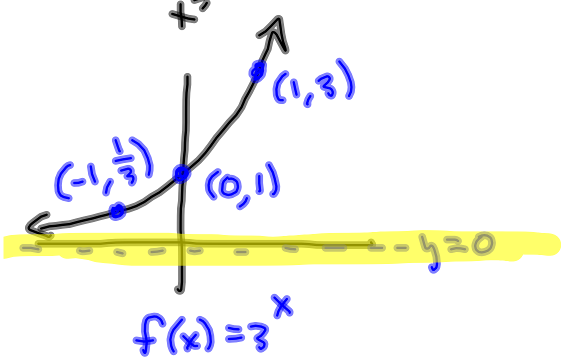
2 $(x,y)\to(\frac{1}{5}x,y)$

3 $(x,y)\to(x-\frac{2}{5},y)$

4 $(x,y)\to(x,y-11)$

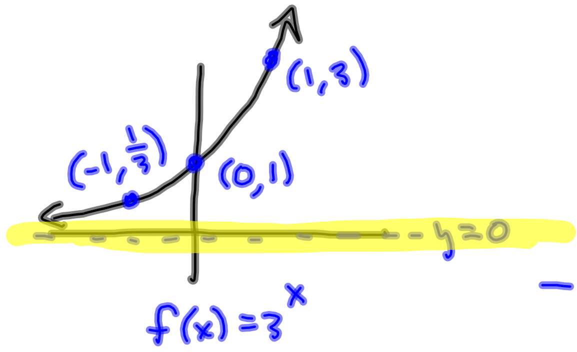
$x+\frac{2}{5}=0$

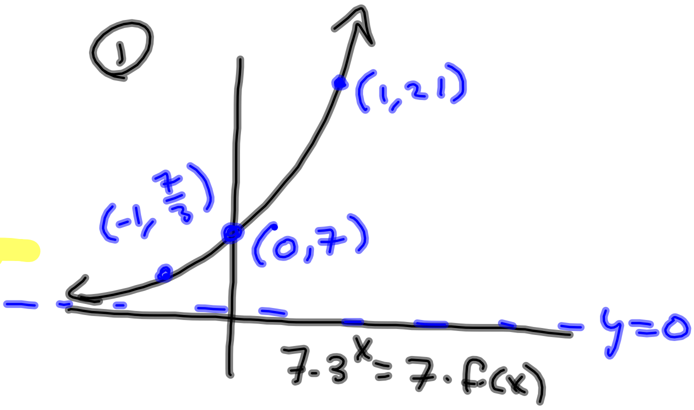
$x=-\frac{2}{5}$



$f(x)=3^x$

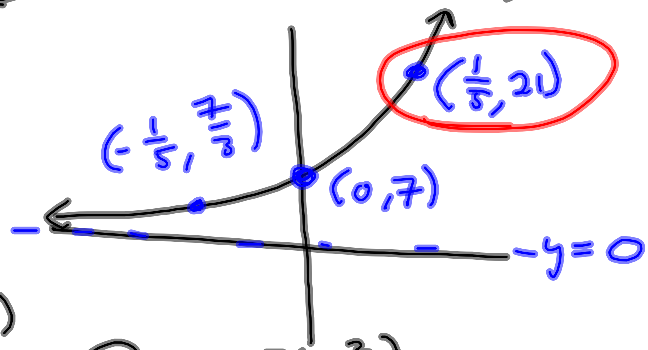
$3^{-100} = \frac{1}{3^{100}} > 0$,
but very close to $y=0$





① $7f(x)=7\cdot3^x$ $\qquad (x,y)\longrightarrow(x,7y)$

② $7\cdot3^{5x}=7f(5x)$

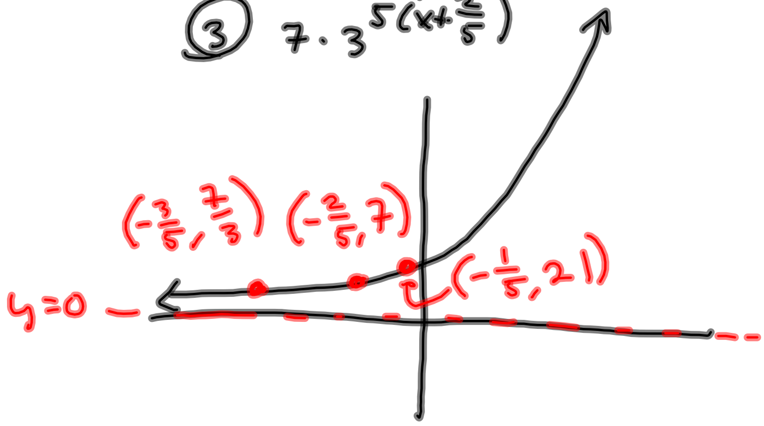


② $7f(5x)=7\cdot3^{5x}$

$(x,y)\longrightarrow(\frac{1}{5}x,y)$

③ $7f(5(x+\frac{2}{5}))=7\cdot3^{5(x+\frac{2}{5})}$

③ $7\cdot3^{5(x+\frac{2}{5})}$



Oct 24-10:18 AM

(4) $7f\left(5\left(x+\frac{2}{5}\right)\right) = 7\cdot 3^{5(x+2/5)} - 11$

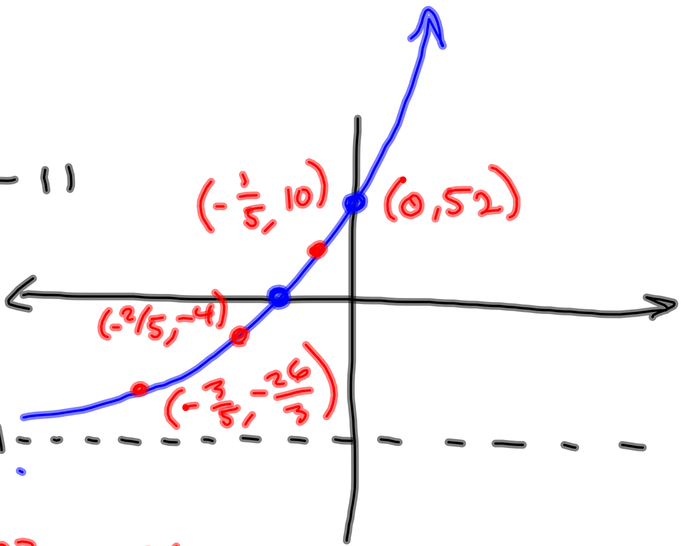
$= g(x)$

Locate y-int. from ORIGINAL.

$g(x) = 7\cdot 3^{5x+2} - 11$

$g(0) = 7\cdot 3^{2} - 11$

$y = -11$



$\frac{7}{3} - 11 = \frac{7-33}{3} = -\frac{26}{3}$

$g(0) = 63 - 11 = 52 \rightsquigarrow (0, 52)$ y-int.

For full credit, we need the x-intercept.

Don't know how, yet.

<u>Need logs</u>

Oct 24-11:04 AM

FRIDAY Quiz on Chapter 3 homework.

Why logs? Because they are the inverse functions of exponential functions. Need that to extract x from exponent, to solve for x.

$2x = 4$ $\qquad f(x) = 2x$

$\frac{1}{2}(2x) = \frac{1}{2}\cdot 4$ $\qquad f^{-1}(x) = \frac{1}{2}x$

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

$x^3 = 8$ $\qquad f(x) = x^3 \Longrightarrow$

$(x^3)^{\frac{1}{3}} = 8^{\frac{1}{3}} = \sqrt[3]{8}$ $\qquad f^{-1}(x) = x^{\frac{1}{3}}$

$x = 2$

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

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

Oct 24-10:35 AM

$f(x) = 3^x$

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

$y = \log_b x$ means

$x = b^y$

$\log_3(81) = \log_3(3^4) = 4$

$\log_2(16) = \log_2(2^4) = 4$

$\log_7(7^x) = x$

$\log_7(x) = f^{-1}(x)$ for $f(x) = 7^x$

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

$\log_7(x)$ plucks the x out of the exponent of $f(x) = 7^x$

Oct 24-10:41 AM

$x^3 = 8$

$(x^3)^{\frac{1}{3}} = 8^{\frac{1}{3}}$

$x = 2$

$3^x = 81 = 3^4$

$\log_3(3^x) = \log_3(81) = 4$

$x = 4$

Exponent Rule

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

$x^2 \cdot x^5 = x^7$

$(a^b)^c = a^{bc}$

$(3^2)^{10} = 3^{20}$

Log Rule

$\log(a \cdot b) = \log(a) + \log(b)$

$\log_3(81) = \log_3(3 \cdot 27)$

$= \log_3(3) + \log_3(27)$

$= 1 + 3 = 4$

$b \log(a) = b \log(a)$

$\log(x^3) = \log(x \cdot x \cdot x)$

$= \log(x) + \log(x) + \log(x)$

$= 3 \log(x)$

$\log\left(\frac{a}{b}\right)$

$= \log\left(a \cdot \frac{1}{b}\right)$

$= \log(a) + \log\left(\frac{1}{b}\right)$

$= \log(a) + \log(b^{-1})$

$= \log(a) - \log(b)$

$$y = \log_b(x)$$
$$b^y = b^{\log_b(x)}$$
$$b^y = x$$
$$\log_a(b^y) = \log_a(x)$$
$$y \log_a(b) = \log_a(x)$$
$$y = \frac{\log_a(x)}{\log_a(b)} = \log_b(x)$$

Change of Base for Calculator Work

Find $\log_3(7)$

$$= \frac{\log_{10}(7)}{\log_{10}(3)}$$

$\log_{10}(x)$ = Common

$\log = \log(x)$

$\log_e(x) = \ln(x)$