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§6.2 (Continued) (pp 92-93) then §6.3 Exponential function (pp 94-96)

21 days until Progress test 3!!!

to check → $f^{-1}(f(x)) = x$

(32) $f(x) = x^3 + 7$ → her answer was $f^{-1}(y) = \sqrt[3]{x-7}$

Check the work. → show $f^{-1}(f(x)) = x$ and $f(f^{-1}(x)) = x$

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

$f^{-1}(x^3+7)$

$= \sqrt[3]{x^3+7-7}$

$= \sqrt[3]{x^3}$

$= x$

Side Work

$f^{-1}(x) = \sqrt[3]{x-7}$

$f^{-1}(\text{any input}) = \sqrt[3]{\text{input}-7}$

$f^{-1}(x^3+7) = \sqrt[3]{x^3+7-7}$

* $f(f^{-1}(x)) = f(\sqrt[3]{x-7})$

$= (\sqrt[3]{x-7})^3 + 7$

$= x - 7 + 7$

$= x$

The student's answer was right.

(38) $f(x) = \frac{4x}{3x-7}$ is one to one, find its inverse. find the domain and range

	f	f^{-1}
domain	$\{x \mid x \text{ is real}, x \neq 7/3\}$	$\{x \mid x \text{ is real}, x \neq 4/3\}$
range	$\{y \mid y \text{ is real}, y \neq 4/3\}$	$\{y \mid y \text{ is real}, y \neq 7/3\}$

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$f^{-1}(x^3+7)$

$= \sqrt[3]{x^3+7-7}$

$= \sqrt[3]{x^3}$

$= x$

Side Work

$f^{-1}(x) = \sqrt[3]{x-7}$

$f^{-1}(\text{any input}) = \sqrt[3]{\text{input} - 7}$

$f^{-1}(x^3+7) = \sqrt[3]{x^3+7-7}$

* $f(f^{-1}(x)) = f(\sqrt[3]{x-7})$

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$= x - 7 + 7$

$= x$

The student's answer was right

(38) $f(x) = \frac{4x}{3x-7}$ is one To one, find its inverse find the domain and range

	f	f^{-1}
domain	$\{x \mid x \text{ is real}, x \neq 7/3\}$	$\{x \mid x \text{ is real}, \cdot \mid \}$
range	$\{y \mid y \text{ is real}, y \neq 4/3\}$	$\{y \mid y \text{ is real}, y \neq 7/3\}$

the domain of f is the same as the range of f^{-1}
the range of f is the same as the domain of f^{-1}

$$f(x) = \frac{4x}{3x-7}$$

① $f(x) \to y$

$$y = \frac{4x}{3x-7}$$

② $x \leftrightarrow y$ $\quad x = \frac{4y}{3y-7}$

③ Solve for y

$$(3y-7)\,x = \frac{4y}{3y-7}\cdot(3y-7)$$

$$3xy - 7x = 4y$$

$y \to$

$$-7x = 4y - 3xy$$

$$\frac{-7x}{4-3x} = \frac{y(4-3x)}{4-3x}$$

$$\frac{-7x}{4-3x} = y$$

$$y = \frac{-7x}{4-3x}$$

④ $y \Rightarrow f^{-1}$

$$f^{-1}(x) = \frac{-7x}{4-3x}\cdot\frac{-1}{-1}$$

$\Downarrow$

same as

$$f^{-1}(x) \quad \frac{7x}{3x-4}$$

$f(x) = \frac{4x}{3x-7}$

Domain.

$3x - 7 = 0$

$3x = 7$

$x = \frac{7}{3}$ "Bad #"

$f^{-1}(x) = \frac{-7x}{4-3x}$

Domain:

$4 - 3x = 0$

$-3x = 4$

$x = \frac{4}{3}$ "is bad"

§6.3 Exponential functions.

Exponential function → $f(x) = C \cdot a^x$ where a and C are real numbers, $a > 0$, $a \neq 1$, $C \neq 0$

a = growth factor

C = initial value

the exponential function has the assymptote $y = 0$ (the x axis).

(60) $p(n) = 100(0.91)^n$ — number of panes of glass.

compare

$p(n) = \boxed{100} \cdot \boxed{0.91^n}$

$f(x) = \boxed{C} \cdot \boxed{a^x}$

a) $p(n) = 100(0.91)^n$

$p(1) = 100 \cdot (0.91)^1$

$= 100 \cdot 0.91$

$= 91$ percent

b) $p(10) = 100(0.91)^{10}$

$\approx 38.94\%$

c) $p(25) = 100(0.91)^{25}$

$\approx 9.46\%$

Define the number e

(111) $D(h) = 6e^{-0.48h}$ → # of hours since the drug was administrated

$D(h)$: amount of the drug in mg in the blood

e: a

After 10 hours $h = 10$

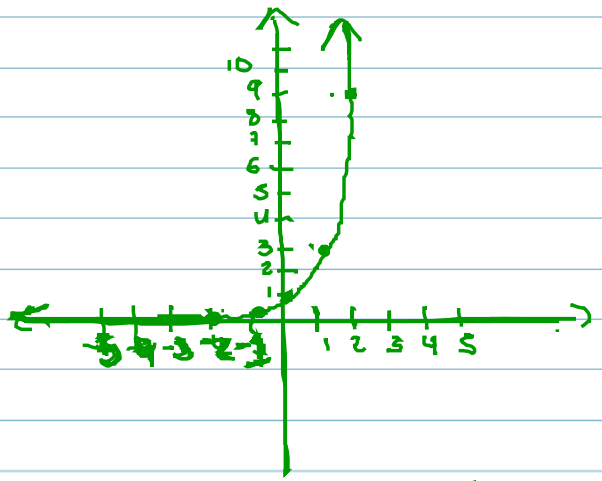
$$D(10) = 6e^{-0.48(10)}$$
$$= 6e^{-4.8}$$
$$\approx 0.05 \text{ mg}$$

C: initial value

$C = 6$

(1) $F(x) = 3^x$

x	y
-2	1/9
-1	1/3
0	1
1	3
2	9



(2)

-1	$\frac{1}{a}$
0	1
1	a

→ for any exponential function.
→ memorize.