

Chapter 3 ZB Questions.

①

#1. $2^{\frac{1}{x}} = 4 - 2^{\frac{1}{x}}$

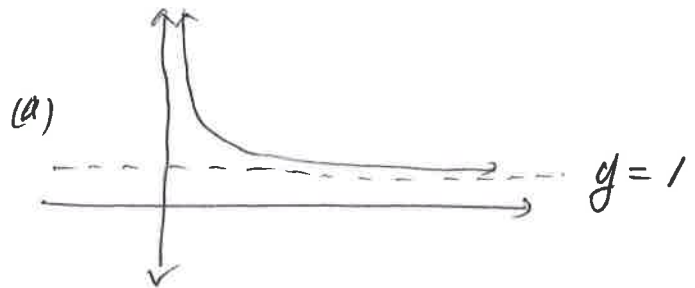
$2^{\frac{1}{x}} + 2^{\frac{1}{x}} = 4$

$2 \cdot 2^{\frac{1}{x}} = 4$

$2^{\frac{1}{x}} = 2$

$\frac{1}{x} = 1 \quad \boxed{x=1}$

#2. $f(x) = \frac{3^x + 1}{3^x - 3^{-x}}$ for $x > 0$



Horizontal Asymptote: $y=1$

$\therefore f(x) > 1$ for all $x > 0$.

#3 $C(t) = 2.5 - 2^{-t}$

(a) $C(0) = 2.5 - 2^{-0} = \boxed{1.5}$

(b) $C(t) = 2.5 - \frac{1}{2^t}$

$C = 2.5$ (Horizontal Asymptote) $3^x \cdot (3 \cdot 3^x - 4 \cdot 3^{-x} = 1) \cdot 3^x$

$\lim_{t \rightarrow \infty} C \rightarrow 2.5 - \frac{1}{2^\infty}$

$\rightarrow \boxed{2.5}$

$\therefore C = 2.5$

(c) $2.4 = 2.5 - 2^{-t}$

$0.1 = 2^{-t}$

$-t = \frac{\log 0.1}{\log 2} \Rightarrow t = \frac{-\log 0.1}{\log 2} \approx \boxed{7.65 \text{ hr}}$

459 min

$\approx 7.65 \text{ hr}$

$3^x = \frac{4}{3}$

~~$3^x = -1$~~

No Solution

$\Rightarrow (3 \cdot 3^x - 4)(3^x + 1) = 0$

$x = \frac{\log(\frac{4}{3})}{\log 3} \approx .262$

#4. (a) $2 \times 2 = 4$ times.

$$(b) A = (320,000) \left(1 + \frac{0.1}{2}\right)^4$$
$$= \$388,962$$

$$(c) \frac{388,962 - 360,000}{388,962} \approx 7.45\%$$

Formula:

(2)

$$A = P \left(1 + \frac{r}{n}\right)^{nt}$$

t : # of yrs

A : \$ after t yrs.

P : Initial Investment

r : Interest rate
in decimal

n : Numbers of compound.

#5. $D(x) = 1.2 \times (0.87)^x$, $x \geq 0$

$$(a) x = 0 \quad D \approx 0.79 \frac{\text{mg}}{\text{L}}$$

$$(b) x = 3 \quad D \approx (1.2)(0.87)^3 \approx 0.79 \frac{\text{mg}}{\text{L}}$$

$$(c) 0.333 = 1.2 (0.87)^x$$

$$\log (0.87)^x = \log \frac{0.333}{1.2}$$

$$x = \frac{\log\left(\frac{0.333}{1.2}\right)}{\log(0.87)} \quad x \approx 9.21 \text{ hrs}$$

#6 $4^x(2 \cdot 4^x + 4^{-x}) = (3) \cdot 4^x$

Multiply $\cdot 4^x$ both Sides

(a) $\Rightarrow 2 \cdot (4^x)^2 + 1 = 3 \cdot 4^x$

$\Rightarrow 2 \cdot (4^x)^2 - 3 \cdot 4^x + 1 = 0$

$(2 \cdot 4^x - 1)(4^x - 1) = 0$

$4^x = \frac{1}{2} \quad 4^x = 1$

$X = -\frac{1}{2}$

$X = 0$

(b) $4^{x-1} = 2^x + 8$

$2^{2(x-1)} = 2^x + 8$

$4 \cdot \left(\frac{2^{2x}}{4}\right) = (2^x + 8) \cdot 4$

Multiply 4 both Sides.

$(2^x)^2 = 4 \cdot 2^x + 32$

$(2^x)^2 - 4 \cdot 2^x - 32 = 0$

$(2^x + 4)(2^x - 8) = 0$

~~$2^x = -4$~~

No solution

$2^x = 8$

$X = 3$