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Matemática C
Lista de exercícios - 05

① a) $2^x = 2^6 \rightarrow x = 6$ b) $2^{3x} = 2^{-5} \rightarrow x = -5/3$

c) $4^x = 2^{-3} \rightarrow 2^{2x} = 2^{-3} \rightarrow x = -3/2$ d) $2^x = 2^{-4} \rightarrow x = -4$

e) $2^{x/3} = 2^3 \rightarrow x = 9$ f) $3x - 1 = 5 \rightarrow x = 2$

g) $4x + 3 = 2 \rightarrow x = -1/4$ h) $x^2 - x - 16 = 4 \rightarrow x = -9/2$

i) $x^2 - x + 4 = 0 \rightarrow x = -1/2$ j) $x^2 - x + x - 1 = x^2 + x + 4 \rightarrow x = 3$ e -2

k) $x = 3/2$ l) $x = -3, 3$

m) $x = 7/4$ m) $x = 9/2$

② a) $4^x = 16 \rightarrow x = 2$

b) $(1/4)^x = 32 \rightarrow 2^{-2x} = 2^5 \rightarrow x = -5/2$

c) $(1/4)^x = 8 \rightarrow 2^{-2x} = 2^3 \rightarrow x = -3/2$

d) $25^x = 1/125 \rightarrow 5^{2x} = 5^{-3} \rightarrow x = -3/2$

e) $5^{(1/2)^x} = 5^1 \rightarrow x = 1 \cdot 2 \rightarrow x = 2$

f) $2^x = \frac{1}{4} \rightarrow x = -2$

③ $S = (100^x = 1/1000) + \left(\left(\frac{3}{2}\right)^x = \frac{4}{9}\right) - \left(\left(\frac{5}{4}\right)^x = \frac{16}{25}\right)$

$S = (10^{2x} = 10^{-3}) + (x = -2) - (x = -2)$

$S = (-3/2) + (-2) - (-2)$

$S = -3/2$

④ $\log_2 (a^2/b^5 \sqrt[3]{c}) = 2\log_2 a - 5\log_2 b - \frac{1}{3}\log_2 c$

b) $\log\left(\sqrt{\frac{ab^3}{c^2}}\right) = \frac{1}{2}\log a - \frac{3}{2}\log b - \frac{2}{2}\log c$

⑤ $5^{\log_5 8} = 8$ b) $7^{\log_7 9} = 9$ c) $e^{\ln 3} = 3$

⑥ $5^x = 5^{2/3} \rightarrow x = 2/3$

b) $10^x = 10^{-3/2} \rightarrow x = -3/2$

c) $\ln e^{-3} = -3$

⑦ a) 1,46497... b) 2,8073... c) 0,23856...

d) 1,58496... e) 0,168260... f) 1,05664...

⑧ $\log \sqrt[3]{a^2 b} = 0,3597$

(9) a) $x-3>0 \rightarrow x>3$

b) $x-2 \neq 1 \rightarrow$ OK)

x^2-4x-5

$\rightarrow \frac{-b \pm \sqrt{b^2-\Delta}}{2a} \rightarrow \frac{4 \pm \sqrt{16-20}}{2}$

$\rightarrow \frac{4-6}{2} = -1 \rightarrow x>-1$

$\rightarrow \frac{4+6}{2} = 5 \rightarrow \boxed{x>5}$

c) $a \neq 1 \rightarrow 1/2$ OK

$-x^2+5x-4>0 \rightarrow \frac{-5 \pm \sqrt{25-16}}{-2}$

$\rightarrow \frac{-5+3}{-2} \rightarrow x>1$

$\rightarrow \frac{-5-3}{-2} \rightarrow x<4$

$\boxed{S=1<x<4}$

d) $(3-x)>0 \rightarrow x<3$

$(2-x)>0 \rightarrow x<2 \rightarrow \boxed{S=x<2}$

(10) $\log(1/10^{-8}) \rightarrow 10^x = 10^{-8} \rightarrow x = -8$

(11) $M = C(1+i)^t \rightarrow M/C = (1+i)^t$

$\log(1+i)^t = \log M/C \rightarrow t = \log M/C$

$t = 5{,}54 \cong$ 5 anos, 6 meses e 19 dias

(12) $177{,}45 = 150(1+0{,}05)^n$

$\frac{177{,}45}{150} = 1{,}05^n \rightarrow n = \log 177{,}45/150 / \log 1{,}05$

$n = 3{,}44$ meses

$\rightarrow n = 3$ meses e 13 dias

(13) $1{,}02^y = 3x$

$1{,}02^x = 3 \rightarrow \log 3 = y$

$\rightarrow y = 55{,}4$

(14) $48{,}10 = 44 \cdot (1+0{,}096)^t$

$\frac{48{,}10}{44} = 1{,}096^t$

$t = \log \frac{48{,}10}{44}$ $\quad t = \frac{0{,}0386923099}{0{,}0398100571}$

$t = 0{,}9712131274$ = 29 dias

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5 días 10 días 15 días 20 días 25 días

(15) 100 → 200 → 400 → 800 → 1600 → 3200

R: 3200 mosquitos

(16) $10(2000) = Q_0 e^{-0,5}$

$Q_0 = 2000 / 0,60653$ ↳ $Q_0 = 3.297,44$

(17) $1500 \cdot 2^{0,2t}$

$2^{0,2t} = \frac{250000}{1500}$ → $t = \frac{222}{6} = 37$ horas

(18)

x	$y = 2^x$
-1	0,5
0	1
1	2
2	4

x	$y = \log_2 x$
1	$\log_2 = 2^0$
2	1
3	1,6
4	2

(19) a)

x	$y = \log_2 x+2$
1	2
2	3
3	3,6
4	4

b)

x	$Y = 1 + \log_{0,2} x$
1	1
2	0
3	-0,6
4	-1

c)

x	$Y = \log(x-2) + 4$
3	4
4	4,3
5	4,5
6	4,6

d)

x	$Y = \log_2 (x+2)$
-1	0
0	1
1	1,6
2	2

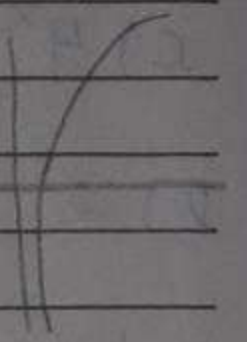
Função logarítmica / Equação Exponencial

$f(x) = \log_b x \rightarrow (b > 0 \text{ e } b \neq 1)$

- Domínio $\rightarrow \mathbb{R}_+^*$
- Imagem $\rightarrow \mathbb{R}$
- Gráfico da função

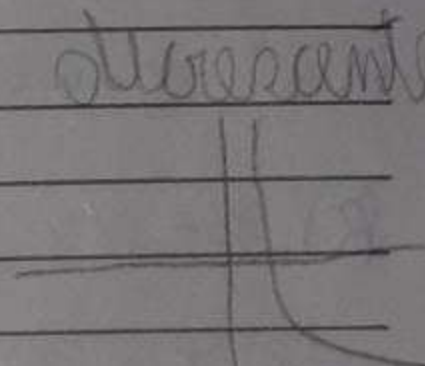
crescente

$b > 1 \rightarrow$



* $b > 1 \rightarrow$ crescente
* $0 < b < 1 \rightarrow$ decrescente $\rightarrow y = \log_b x$

decrescente



$y = \log_b x$ é a função inversa de $y = b^x$

Equação logarítmica

$\log(x+2) = \log(3x-1)$

1º → Condição de existência
↳ $x + 2 \geq 0$ e $3x - 1 \geq 0$
$x \geq -2$ e $x \geq 1/3$

2º → $x + 2 = 3x - 1 \rightarrow x = 3/2$

$\log_b A = x \rightarrow b^x = A$

Substituição

$\log_2 x^2 - \log_2 x = 2$

$y^2 - y - 2 = 0$