

$3 = e^x$ variable exponent
 $\ln 3 = \ln e^x$
 $\ln 3 = x \cdot \ln e$
 $\ln 3 = x$
 $3 = e^{-x}$
 $\ln 3 = \ln e^{-x}$

Renew Sem test Stations

$$\begin{bmatrix} x & y \\ 10 & -1 \\ 0 & 1 & -1 \end{bmatrix}$$

Go to all eight stations in any order. Show your work and circle your answer.

Station #1

$$\begin{aligned} X + 2y &= 2 \\ X - 2y &= 6 \end{aligned}$$

$$\begin{bmatrix} 1 & 2 & 2 \\ 1 & -2 & 6 \end{bmatrix}$$

a) $(4, -1)$ Yes

$$\begin{aligned} 4 + 2(-1) &= 2 \\ 4 - 2 &= 2 \\ 2 &= 2 \checkmark \end{aligned}$$

$$4 - 2(-1) = 6$$

$$\begin{bmatrix} 1 & 0 & 4 \\ 0 & 1 & -1 \end{bmatrix}$$

$$(4, -1)$$

Station #2

get rid of fractions by mult by 6

$$\begin{aligned} \left(\frac{1}{6}X - \frac{1}{2}Y\right) &= \left(\frac{1}{3}\right)6 \\ X + 2y &= -3 \end{aligned}$$

$$\begin{bmatrix} 1 & 2 & -3 \\ -1 & 2 & 3 \end{bmatrix}$$

create opp

$$(X - 3y) = (2)$$

$$X + 2y = -3$$

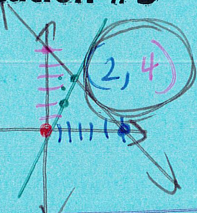
$$-1X + 3y = -2$$

$$\begin{aligned} 5y &= -5 \\ y &= -1 \end{aligned}$$

$$\begin{aligned} X + 2(-1) &= -3 \\ X - 2 &= -3 \\ X &= -1 \end{aligned}$$

Station #3

$$\begin{aligned} X + Y &= 6 \\ y &= 2x + 0 \end{aligned}$$



$$\begin{aligned} X + 2X &= 6 \\ 3X &= 6 \\ X &= 2 \end{aligned}$$

$$(2, 4)$$

Station #4

change exponent to same

$$a) \log_3(x+6) + \log_3(x+4) = 1$$

$$\log_3(x+6)(x+4) = 1$$

$$3^1 = (x+6)(x+4)$$

$$3 = x^2 + 10x + 24$$

$$0 = x^2 + 10x + 21$$

$$(x+7)(x+3)$$

$$X = -7 \text{ Extraneous}$$

$$X = -3$$

b) $\log(x-4) - \log 2 = \log(5x+1)$

$$\log \frac{x-4}{2} = \log(5x+1)$$

$$\log(\text{this}) = \log(\text{that})$$

$$\text{this} = \text{that}$$

$$\frac{x-4}{2} = 5x+1 \quad \frac{x-4}{x+2} = \frac{10x+2}{-6+9x}$$

Station #5

When variable is in exponent take ln or log of both sides

$$a) 5^{3x+2} = 125$$

$$\ln 5^{3x+2} = \ln 125$$

$$(3x+2) \ln 5 = \ln 125$$

$$\frac{\ln 5}{\ln 5} \cdot (3x+2) = \frac{\ln 125}{\ln 5}$$

$$3x+2 = 3$$

$$3x = 1$$

$$X = \frac{1}{3}$$

$$b) (e^x)^2 - 2e^x - 3 = 0$$

$$m = e^x$$

$$m^2 - 2m - 3 = 0$$

$$(m-3)(m+1) = 0$$

$$m = 3 \quad m = -1$$

$$e^x = 3 \quad e^x = -1$$

$$\ln e^x = \ln 3 \quad \text{Not possible}$$

$$X \cdot \ln e = \ln 3$$

$$X = \ln 3$$

Station #6

$$\text{Cost} = 100,000 + 100X$$

$$\text{Revenue} = 300X$$

Break even when Cost = Revenue

$$100,000 + 100x = 300x$$

$$-100x \quad -100x$$

$$100,000 = 200x$$

$$X = 500 \text{ Bikes for a breakeven point}$$

$$\text{of } \$150,000$$

Station #7

g = gallons milk (2)
w = water (5) spent \$19
c = chips (6)

$$2g + 5w + 6c = 19$$

$$w = 2c$$

$$g = 2 + w$$

$$g = 2 + 2c$$

Chips cost \$.75
Water cost \$1.50
Milk cost \$3.50

Then write a sentence

$$2(2+2c) + 5(2c) + 6c = 19$$

$$4 + 4c + 10c + 6c = 19$$

$$20c + 4 = 19$$

$$20c = 15$$

$$c = \frac{15}{20}$$

$$c = .75$$

Station #8

$$A = A_0 \cdot e^{kt}$$

1) First find k... If you started with 40 gm after 345 days you would have 20 gm

$$\frac{20}{40} = \frac{40}{40} \cdot e^{k(345)}$$

$$\frac{1}{2} = e^{345k}$$

$$\ln\left(\frac{1}{2}\right) = \ln e^{345k}$$

$$\ln\left(\frac{1}{2}\right) = 345k \cdot \ln e$$

$$\frac{\ln\left(\frac{1}{2}\right)}{345} = k$$

$$-.002 = k$$

now you know k = -.002

$$A = A_0 \cdot e^{-.002t}$$

When will you have 30% left. You start w/ 100%

Now solve for t

$$30 = 100 \cdot e^{-.002t}$$

$$\frac{30}{100} = e^{-.002t}$$

$$.3 = e^{-.002t}$$

$$\ln .3 = \ln e^{-.002t}$$

$$.9 = t$$

$$\ln .602 \text{ days}$$