S4.2 #43

Sketch

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

down 3 left 2

Basic Graph: $g(x) = \log(x)$ $D = (0, \infty)$ $R = (-\infty, \infty)$

(100, 2)

(10, 1) = (b, 1)

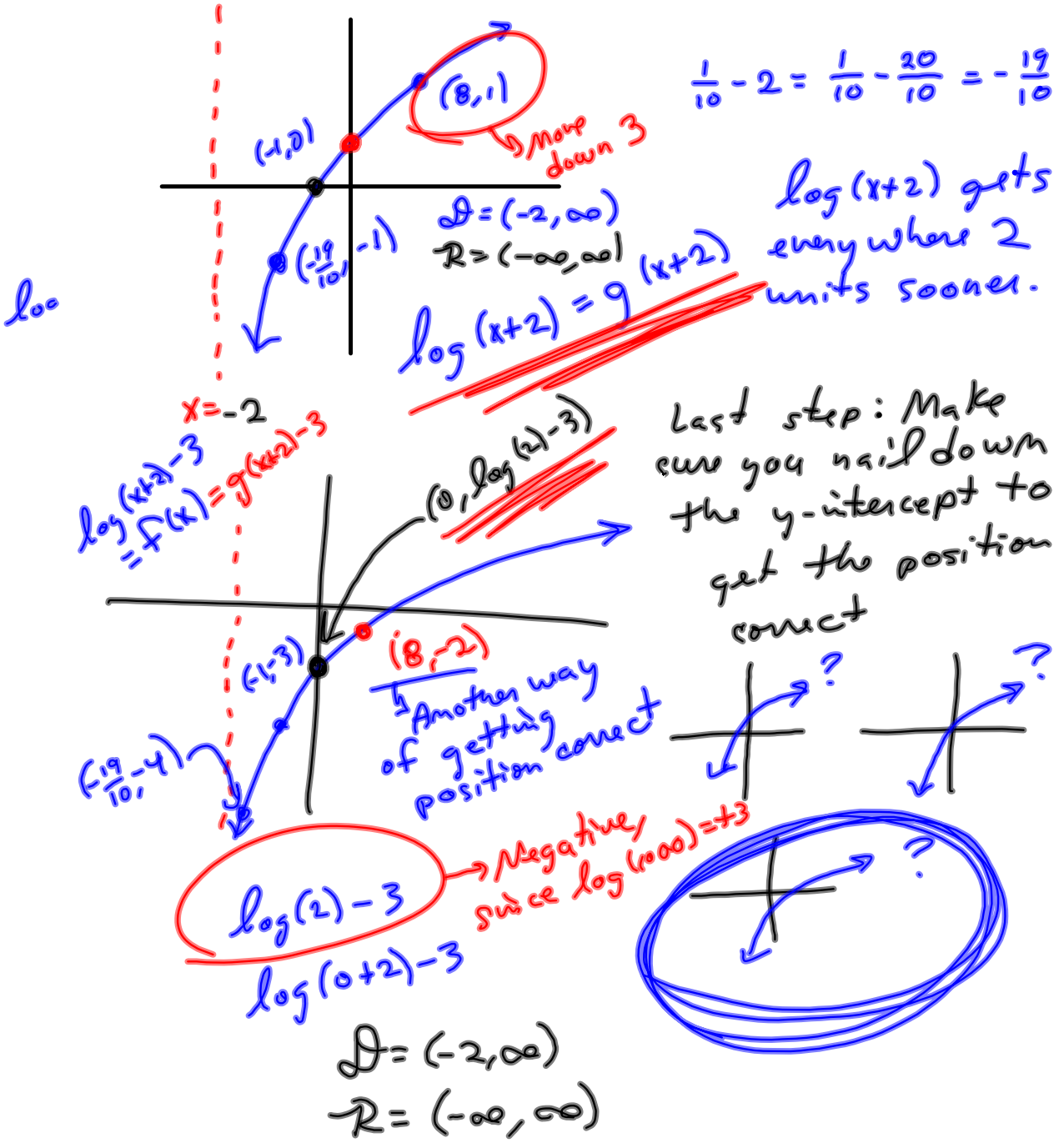
(1, 0) = (1, 0)

$(\frac{1}{10}, -1) = (\frac{1}{b}, -1)$

$\log_b x$, $b > 1$

x = 0

Left 2 from previous.


(8,1)
Move down 3
(-1,0)
(-19/10, -1)
D=(-2,∞)
R=(-∞,∞)
log(x+2) gets every where 2 units sooner.
log(x+2) = g(x+2)
x=-2
log(x+2)-3 = f(x) = g(x+2)-3
(0, log(2)-3)
Last step: Make sure you nail down the y-intercept to get the position correct
(8,-2)
Another way of getting position correct
(-1,-3)
(-19/10, -4)
log(2)-3
Negative since log(1000)=+3
log(0+2)-3
D=(-2,∞)
R=(-∞,∞)

53, 54

$4 \cdot 1.02^x = 3 \cdot 1.03^x$ $= 4.08^x$ No!

$1.02^x = \frac{3}{4} \cdot 1.03^x$ $\frac{3 \cdot 1.03^x}{4} = \frac{3}{4} \cdot 1.03^x$

$\log_{1.02}(1.02^x) = \log_{1.02}\left(\frac{3}{4} \cdot 1.03^x\right)$

$x = \log_{1.02}\left(\frac{3}{4}\right) + \log_{1.02}(1.03^x)$ (a)

$x = a + \log_{1.02}(1.03)\, x$

$x = a + bx$

$b = \log_{1.02}(1.03)$
$a = \log_{1.02}\left(\frac{3}{4}\right)$

$x - bx = a$

$x\left(\frac{x}{x} - \frac{bx}{x}\right) = x(1-b) = a$

$x = \frac{a}{1-b}$

8 outta 10

$3 + 6b$
$= 3\left(\frac{3}{3} + \frac{6b}{3}\right)$
$= 3(1 + 2b)$

PEMDAS Evaluate Expression

SADMEP Solve Equation

$$x = \frac{a}{1-b} = \frac{\log_{1.02}(3/4)}{1-\log_{1.02}(1.03)}$$

$$= \frac{\frac{\ln(3/4)}{\ln(1.02)}}{1-\frac{\ln(1.03)}{\ln(1.02}} \approx 29.4872$$

$$\frac{\frac{\ln\left(\frac{3}{4}\right)}{\ln(1.02)}}{1-\frac{\ln(1.03)}{\ln(1.02)}}$$

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ln(3/4)/ln(1.02)
/(1-ln(1.03)/ln(
1.02))
      29.48717854
■
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$$-102.4991870 \ln\left(\frac{3}{4}\right)$$

evalf (%)

29.48717855

$4 \cdot 1.02^x = 3 \cdot 1.03^x$

$\log_{1.02}(4 \cdot 1.02^x) = \log_{1.02}(3 \cdot 1.03^x)$

$\log_{1.02}(4) + \log_{1.02}(1.02^x) = \log_{1.02}(3) + \log_{1.02}(1.03^x)$

$a + x = b + cx$

$x - cx = b - a$

$x(1-c) = b - a$

$x = \frac{b-a}{1-c} = \frac{\log_{1.02}(3) - \log_{1.02}(4)}{1 - \log_{1.02}(1.03)}$

$= \log_{1.02}(3/4)$

$c: \quad x \cdot \log_{1.02}(1.03)$

= Same thing.

$4 \cdot 1.02^x = 3 \cdot 1.03^x$

$1.02^x = \frac{3}{4} \cdot 1.03^x$

$\ln(1.02^x) = \ln(\frac{3}{4} \cdot 1.03^x)$

$\ln(1.02)x = \ln(\frac{3}{4}) + \ln(1.03^x)$

$ax = b + \ln(1.03)\,x$

$ax = b + cx$

$ax - cx = b$

$x(a-c) = b$

$x = \frac{b}{a-c} = \frac{\ln(3/4)}{\ln(1.02) - \ln(1.03)}$

$a = \ln(1.02)$

$b = \ln(3/4)$

$c = \ln(1.03)$

missed parenthesis

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ln(3/4)/(ln(1.02
-ln(1.03))
      29.95196639
ln(3/4)/(ln(1.02
))-ln(1.03))
      29.48717854
```

Yeppers!

The $\frac{1}{2}$-life of C-14 is 5730 yrs.

$A(t) = Pe^{rt}$ is the model.

$A(5730)$ is $\frac{1}{2}P$

$Pe^{5730r} = \frac{1}{2}P$ is THE $\frac{1}{2}$-life equation from the statement.

How old is a fire pit in which the amt of C-14 is 10% of the amt of C-14 in the atmosphere?

$Pe^{rt} = .1P$

Use the $\frac{1}{2}$-life eq'n to find r = relative decay rate. Then use r in the 2nd eq'n to find t.

How old is a sample that contained 100g of C-14, but now only contains 7g?

$$100e^{rt} = 7$$

You'd need the r to solve for t.
You get the r from $\frac{1}{2}$-life.