Questions

10
13
14

10b
12
15cd
23

10) $I = 10^{1-0.13x}$

$4.2 \leq 10^{1-0.13x}$

$\log 4.2 \leq \log 10^{1-0.13x}$

$\log 4.2 \leq 1 - 0.13x$

$\log 4.2 - 1 \leq -0.13x$

$\frac{\log 4.2 - 1}{-0.13} \geq x$

$2.9\text{m} \geq x$

13) $\frac{m}{2} = m(1-0.021)^c$

$\frac{1}{2} = (1-0.021)^c$

$\frac{1}{2} = 0.979^c$

$\log \frac{1}{2} = \log 0.979^c$

$\frac{\log \frac{1}{2}}{\log 0.979} = c$

$33 \text{ cycles} \doteq c$

$A = P(1+r)^n$

14) $4000 = 2500(1+0.065)^t$

$1.6 = 1.065^t$

$\frac{\log 1.6}{\log 1.065} = t$

$7.5\text{y} = t$

10b
12
15cd
23

$\sqrt[n]{x} = x^{1/n}$

10b) $4^x = 16\sqrt{128}$

$2^{2x} = 2^4(2^{7/2})$

$2^{2x} = 2^{4+7/2}$

$2x = 4 + 7/2$

$2x = \frac{15}{2}$

$x = \frac{15}{4}$

12a) $4^x[4^x + 6(4^{-x})] = [5]4^x$

$4^x \cdot 4^x + 6 \cdot 4^{-x} \cdot 4^x = 5 \cdot 4^x$

$4^{2x} + 6 \cdot 4^0 = 5 \cdot 4^x$

$4^{2x} + 6 = 5 \cdot 4^x$

$4^{2x} - 5 \cdot 4^x = -6$

$4^x(4^2 - 5) = -6$

$4^x(16 - 5) = -6$

$4^x \cdot 11 = -6$

$4^x = -\frac{6}{11}$ something went wrong...

$4^x - 6 \cdot 4^{-x} = 5$ Let $t = 4^x$

$t - 6t^{-1} = 5$ $(4^x)^{-1}$

$t - \frac{6}{t} = 5$

$t^2 - 6 = 5t$

$t^2 - 5t - 6 = 0$

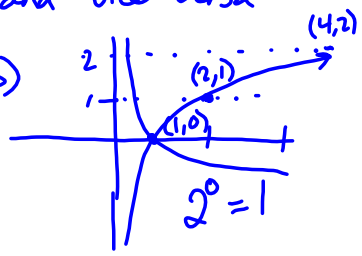
$(t-6)(t+1) = 0$

$(4^x - 6)(4^x + 1) = 0$

Test Things

$\log_3 9 = 2 \Leftrightarrow 3^2 = 9$

- Logarithms
  - → switch to exponential and vice-versa
  - → graph i.e. $y = \log_2(x+3)$



  - → transformations $2^y = x$, $2^1 = x$
  - → laws + rules

$\log a^n = n \log a$

$b^{\log_b n} = n$

$\log_b b^n = n$

$\log_b b = 1$

$\log_b(mn) = \log_b m + \log_b n$

$\log_b\left(\frac{m}{n}\right) = \log_b m - \log_b n$

  - → Solving Equations

ex $\log_2 32 = x$ $\quad 3^x = 27$

$3^x - 3^{x+4} = 3000$

$3^x(1 - 3^4) = 3000$

$\log_5(x+2) + \log_5(x-3) = \log_5(3x+1)$

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

* Don't forget restrictions!

  - → Express as a single logarithm
  - → Word problems
    - → pH $\quad P = -\log[H^+]$
    - → earthquake magnitude
    - → sound levels $= 10 \log\left(\frac{I}{I_0}\right)$
    - → half-life $M = M_0\left(\frac{1}{2}\right)^{t/k}$
    - → population growth/decay / compound interest

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#1c, 2d, 3d(graph too), 4, 5b, 6b, 8, 9, 10abc, 11c, 12, 13, 14bc, 15cd, 17, 18, 19, 20, 22, 23

pg. 512 - Chapter Self-Test