Precalc Chapter 3 Review Name DiMarco

1. The half-life of a substance is 4 minutes. The original mass is 100 grams. How much of the substance remains after 15 minutes?

$A(t) = 100\left(\frac{1}{2}\right)^{t/4}$

$A(t) = 100\left(\frac{1}{2}\right)^{15/4} \approx$ **7.43 grams**

2. Write a logistic function if:

Initial value = 10, Limit to growth = 50, Passes through (2,30)

(0,10) $C = 50$ x y

$10 = \frac{50}{1 + a \cdot b^0}$

$10 + 10a = 50$

$10a = 40$

$a = 4$

$30 = \frac{50}{1 + 4b^2}$

$30 + 120b^2 = 50$

$120b^2 = 20$

$b^2 = \frac{1}{6}$

$b \approx .41$

$f(x) = \frac{50}{1 + 4(.41)^x}$

Solve for x:

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

$4^{\frac{1}{2}} = \sqrt{4} = 2$

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

$\frac{x+1}{2x-1} = 2$

$4x - 2 = x + 1$

$3x = 3$

$x = 1$

4. $\log_4(x-3) = -1$

$4^{-1} = x - 3$

$\frac{1}{4} = x - 3$

$3\frac{1}{4} = x$

5. $1 + 2e^{-2x} = 6$

$2e^{-2x} = 5$

$e^{-2x} = 2.5$

$\ln 2.5 = -2x$

$x = \frac{\ln 2.5}{-2} \approx$ **-.458**

6. $\left(\frac{1}{4}\right)^{4x-1} = 8^{3x}$

$\left(\frac{1}{2}\right)^{2(4x-1)} = \left(\frac{1}{2}\right)^{-3(3x)}$

$2(4x-1) = -3(3x)$

$8x - 2 = -9x$

$17x = 2$

$x = 2/17$

7. Write the equation of an exponential function that goes through (0,2) and (3,12). (Round b-value to nearest hundredths.)

a x y

$y = a \cdot b^x$

$12 = 2 \cdot b^3$

$6 = b^3$

$1.82 \approx b$

$y = 2 \cdot 1.82^x$

8. The population of Chicago has been increasing at 1.2% per year. If the population is 3,000,000 in 2000, when will the population reach 3,500,000?

growth $r = .012$ P_0

$P(t) = 3{,}000{,}000(1 + .012)^t$

$3{,}500{,}000 = 3{,}000{,}000(1.012)^t$

$\frac{35}{30} = (1.012)^t$

$t = \frac{\log \frac{35}{30}}{\log 1.012} \approx$ **12.923 years**