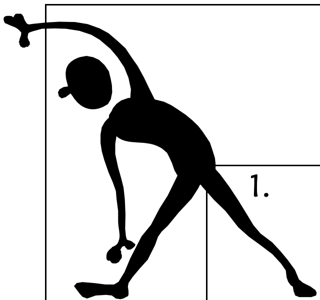
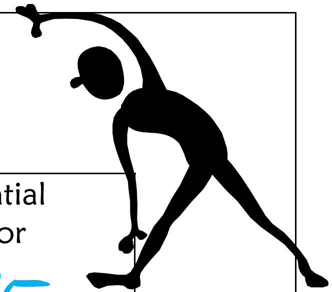


Precalculus Warm-Ups

Section 3.2



1. Determine whether the function is exponential decay or exponential growth. State the initial value as well as the percentage of decay or growth.

   $y = 350(.25)^x$

   Decay

   Initial Value=350

   $r = .75$

2. A radioactive material has a half-life of 120 days. If there are 9 grams of the material initially,

   a) Write an equation representing the information.

   $f(x) = 9\left(\frac{1}{2}\right)^{x/120}$

   b) When will there be less than 1 gram of the material left?

   $y_2 = 1$

   ≈ 380 days

   $(.17)^\wedge(1/4)$

3. Determine a formula for an exponential equation containing the points (0, 3) and (4, 0.5)

   a x y

   $y = a \cdot b^x$

   $.5 = 3 \cdot b^4$

   $.17 = b^4$

   $.639 = b$

   $\boxed{f(x) = 3(.639)^x}$

4. Determine a formula for a logistic function with the following characteristics:

   Limit to Growth: 40 $c = 40$

   Initial Value: 10 $(0, 10)$

   Passes through: (1, 20) (x, y)

   ① $f(0) = \dfrac{40}{1 + a \cdot \cancel{b^0}} = 10$

   $\dfrac{40}{1+a} = 10$

   $10 + 10a = 40$

   $a = 3$

   ② $f(1) = \dfrac{40}{1 + 3 \cdot b^1} = 20$

   $\dfrac{40}{1+3b} = 20$

   $20 + 60b = 40$

   $b = .33$

   $f(x) = \dfrac{40}{1 + 3(.33)^x}$

5. The population of Mathtown, USA is 475,000 and is increasing at a rate of 3.75% each year. Find an equation to represent this scenario and use it to predict when the population will reach 1 million.

   $P(t) = 475{,}000(1.0375)^t$

   $y_2 = 1{,}000{,}000$

   $t \approx 20.2$ years

   (in 20.2 years)