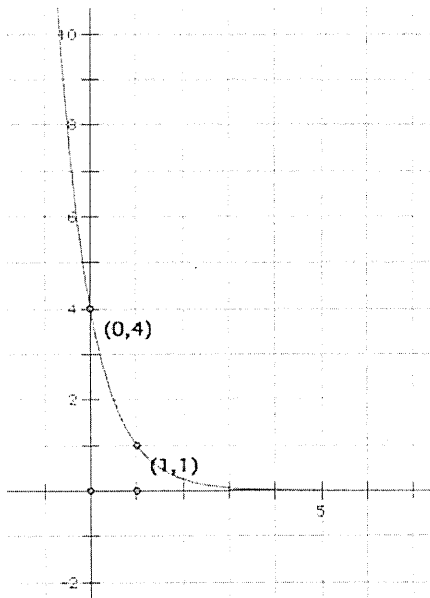


1) Write the **exponential** equation for the graph.



$$\begin{array}{c|c} x & y \\ \hline 0 & 4 \\ 1 & 1 \end{array}$$

$$y = ab^x$$

$$b^{x_2 - x_1} = \frac{y_2}{y_1}$$

$$b^{1-0} = \frac{1}{4}$$

$$4 = a(0.25)^0$$

$$b^1 = 0.25$$

$$\frac{4}{1} = \frac{1a}{1}$$

$$a = 4$$

$$y = 4(0.25)^x$$

2) Fit a **quadratic** model to the data. Use calculator.

Time (sec)	0	2	3	5	8
Height (ft)	366	345	313	250	191

$$y = -0.464x^2 - 19.507x + 372.285$$

For #3-5) State whether the function described by the equation models exponential growth, exponential decay or neither.

3)  $a(b) = (5)(0.23)^b$

• Decay  
•  $0 < b < 1$

4)  $g(x) = 4x^3$

• neither  
• Exponent not the variable

5)  $h(v) = 0.25(1.45)^v$

• Growth  
•  $b > 1$

6) An Isotope of tantalum  $^{179}\text{Ta}$  has half-life of 1.23 hours. How much of a 5-gram sample will be left after 3.2 hours? Round answer to 3 decimal places.

$$(0.5) = (b^{1.23})^{1.23}$$

$$b = 0.529$$

$$y = 5(0.529)^{3.2}$$

$$y = 0.823 \text{ grams}$$

7) Suppose a ball is thrown upward at a velocity of  $\overset{v_0}{15\text{m/sec}}$  from a  $\overset{h_0}{20\text{-meter}}$  building.

a) Write an equation for the height  $h$  above the ground of the ball after  $t$  seconds.

Use the formula:  $h = -\frac{1}{2}gt^2 + v_0t + h_0$  where  $g = 9.8\text{m/sec}^2$

$$h = -\frac{1}{2}(9.8)t^2 + 15t + 20$$

$$\boxed{h = -4.9t^2 + 15t + 20}$$

b) Predict the height of the ball after 3 seconds.

$$h(3) = -4.9(3)^2 + 15(3) + 20$$

$$\boxed{h = 20.9\text{m}}$$

c) At what time will the ball hit the ground? (Hint - Use the Quadratic Formula)

$$0 = -4.9t^2 + 15t + 20 \quad a = -4.9 \quad b = 15 \quad c = 20$$

$$x = \frac{-15 \pm \sqrt{(15)^2 - 4(-4.9)(20)}}{2(-4.9)}$$

$$x = \frac{-15 \pm \sqrt{617}}{-9.8} \rightarrow \frac{-15 + \sqrt{617}}{-9.8} = -1.004 \text{ sec}$$

$$\rightarrow \frac{-15 - \sqrt{617}}{-9.8} = \boxed{4.07 \text{ sec}}$$

8) A parabola contains the points  $(-1, 6)$ ,  $(1, 2)$ , and  $(2, -9)$

a) Set up the system of equations.

$$y = ax^2 + bx + c$$

$$6 = a(-1)^2 + b(-1) + c \rightarrow 6 = 1a - 1b + 1c$$

$$2 = a(1)^2 + b(1) + c \rightarrow 2 = 1a + 1b + 1c$$

$$-9 = a(2)^2 + b(2) + c \rightarrow -9 = 4a + 2b + 1c$$

b) Write the matrix equation.

$$\begin{bmatrix} 1 & -1 & 1 \\ 1 & 1 & 1 \\ 4 & 2 & 1 \end{bmatrix} \begin{bmatrix} a \\ b \\ c \end{bmatrix} = \begin{bmatrix} 6 \\ 2 \\ -9 \end{bmatrix}$$

$[A] \quad [x] \quad [B]$

$$[x] = [A]^{-1}[B]$$

c) Write the equation for the parabola. (Hint - Quadratic Equation)

$$\begin{bmatrix} -3 \\ -2 \\ 7 \end{bmatrix} \rightarrow \begin{matrix} a \\ b \\ c \end{matrix}$$

$$y = -3x^2 - 2x + 7$$