Math 100 Class Work on Functions and Functional Notation

Suppose the variables "x" and "y" represent quantities that are in a functional relationship. We often use the symbolism

$$y = f(x)$$

to indicate that y is a function of x. We read this equation as "y equals *f* of x." The symbol "*f*(x)" is another symbol for the variable y. Our *independent variable* is x and y is the *dependent variable* because its value depends on the value of x.

Example 1: Suppose that an object is dropped from a height of 500 feet. Between the time the ball is released and the time it hits the ground, the distance the object has fallen depends on the time elapsed since that ball was released.

Suppose
t = the number of seconds since the ball was released, and
d(t) = the distance in feet the ball has fallen in t seconds.

The distance the ball has fallen in t seconds can be described by the function

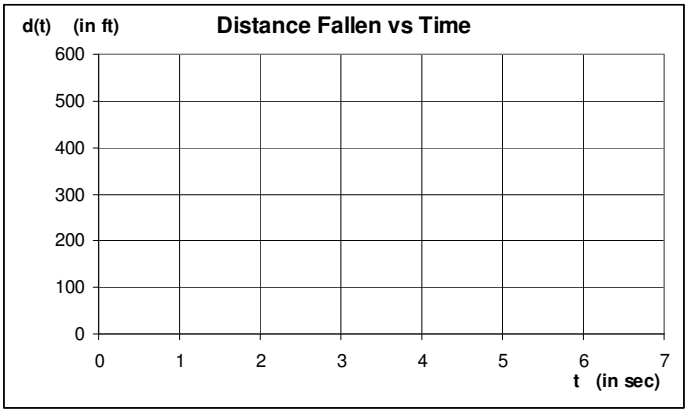
$$d(t) = 16t^2.$$

We denote the distance (in feet) fallen in 2 seconds by d(2). In this case d(2) = 64; so the ball falls 64 feet in 2 seconds.

Calculate and interpret the meaning of d(3) and d(5).

Complete the table and sketch a graph of this function.

t	d(t)	Δd(t)	ΔΔd(t)
0			
1			
2			
3			
4			
5			
6			



What is a reasonable domain for this function?

What is a reasonable range for this function?

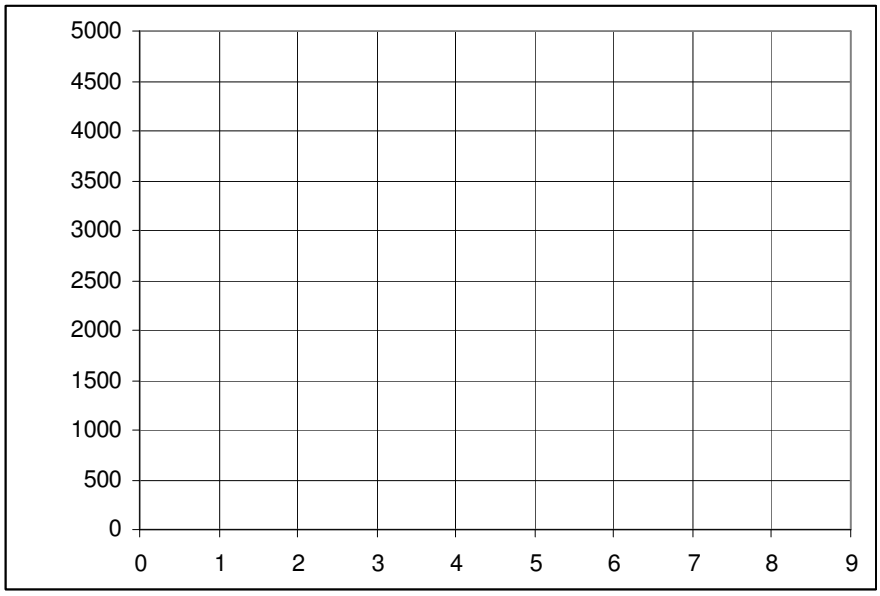
Example 2: Suppose a business purchases a new computer for $4000. The value of the computer drops or depreciates by $500 per year following the purchase.

Let t = the number of years since the computer was purchased, and
V(t) = the depreciated value of the computer t years after being purchased.

a. Write a formula for the functional relationship between V(t) and t.

b. Calculate and interpret the meaning of V(4)

c. Graph the function and interpret the meaning of two intercepts and the slope.



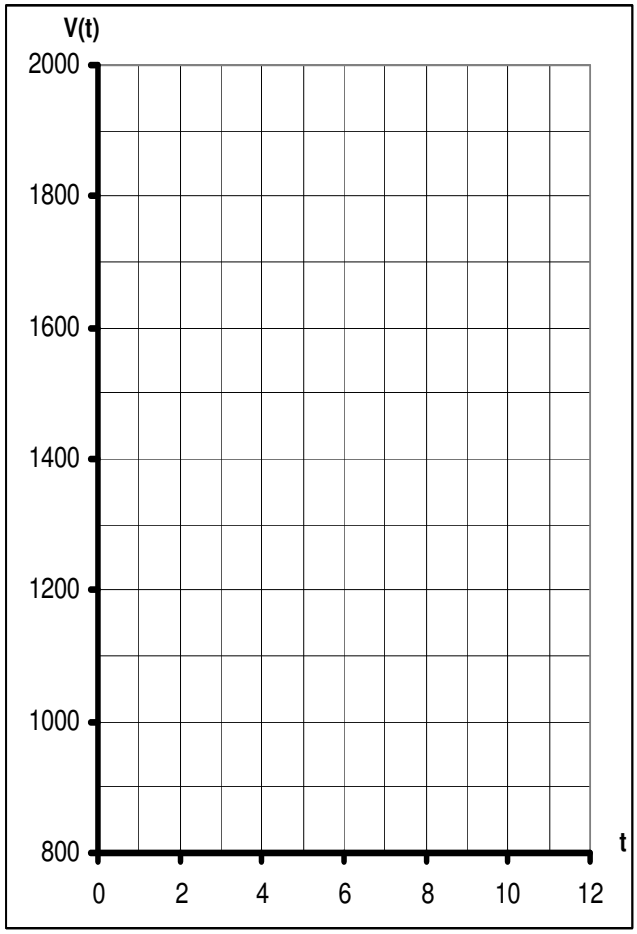
Δt	t	V(t)	ΔV(t)	ΔV(t) /Δt
	0			
	2			
	4			
	6			

Example 3: At the beginning of the year 2000 a sum of $1000 was placed in an account that pays interest at the rate of 6% per annum compounded at the end of each year. Assuming no further deposits or withdrawals are made, what will be the value of the account at the beginning of each year until the year 2010?

If we let t = the number of years since the beginning of 2000, and
V(t) = the value of the account t years after the beginning of 2000, then we will show later that the functional relationship between the value of the account and the number of years since the beginning of 2000 can be expressed by the rule

$$V(t) = 1000(1.06)^t \text{ where t is a whole number.}$$

Complete the table and graph of the relationship.



t	V(t)	ΔV(t)	ΔΔV(t)
0			
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

List the values in the domain of V:
List the values in the range of V:

Since "V(t)" means " the value of the account t years after the beginning of 2000," it follows that "V(4)" means "the value of the account 4 years after the beginning of 2000."

Find the value of V(4):
What is the value of t if we know V(t) = $1418.52?