1. For every equation E, if is quadratic then E has at most two real solutions.
2. All quadratic equation, have at most two real solutions.
3. Every quadratic equation, has at most two real solutions.
4. If an equation is quadratic, then it has at most two real solutions.
5. If E is a quadratic equation, then E has at most two real solutions.
6. For every quadratic equation E, there are at most two real solutions.
7. There is a real number whose product with every number equals zero.
8. Some has the property that its, product with every real number equals zero.
9. There is a real number such that the product of a, with every real number is zero.
10. There is a real number a with a property that for every real number b, ab=0

3. Let 𝑅 = {𝑎}, 𝑆 = {𝑥,𝑦}, and 𝑇 = {𝑝,𝑞,𝑟}. Find each of the following sets.

a. 𝑅 × (𝑆 × 𝑇)

Ans = {a}\*[{x,y}\*{p,q,r}] = {a}\*[{x,p},{x,q},{x,r},{y,p},{y,q},{y,r}] = {a,(x,p)},{a,(x,q)},{a,(x,r)},{a,(y,p)},{a,(y,q)},{a,(y,r)}

b. (𝑅 × 𝑆) × 𝑇

Ans =[{a}\*{x,y}]\*{p,q,r} = [{a,x},{a,y}]\*{p,q,r} = {(a,x),p},{(a,y),p},{(a,x),q},{(a,y),q},{(a,x),r},{(a,y),r}

c. 𝑅 × 𝑆 × 𝑇

Ans= {a}\*{x,y}\*{p,q,r} = {a,x,p},{a,y,p},{a,x,q},{a,y,q},{a,x,r},{a,y,r}

4.Let 𝑇 = {𝑥,𝑦} . List all the strings of length 5 over T that have exactly one y

Ans = xxxxy, xyxxx, xxyxx, xxxyx, xxxxy

5. Let A={4,5,6} and B={5,6,7} and define relations R , S , and T from A to B as follows:   
For every (𝑥,𝑦) ∈ 𝐴 × 𝐵 :  
(𝑥,𝑦) ∈ 𝑅 means that 𝑥 ≥ 𝑦.  
(𝑥,𝑦) ∈ 𝑆 means that 𝑥 ― 𝑦  
2 is an integer.  
𝑇 = {(4,7),(6,5),(6,7)}.

Ans= if (𝑥,𝑦) ∈ 𝐴 × 𝐵 :

A\*B = {4,5,6}\*{5,6,7} = {4,5},{4,6},{4,7},{5,5},{5,6},{5,7},{6,5},{6,6},{6,7}

# If (𝑥,𝑦) ∈ 𝑅 means that 𝑥 ≥ 𝑦,then R = {5,5},{6,6},{6,5}

#If (𝑥,𝑦) ∈ 𝑆 means that x – y / 2 is an integer then

4-5/2= -1/2, which is not an integer

4-6/2=-1, which is an integer

4-7/2= -3/2, which is not an integer

5-5/2 = 0 which is integer

5-6/2= -1/2, which is not an integer

5-7/2=-1 which is an integer

6-5/2=-1/2, which is not an integer

6-6/2 = 0, which is an integer

6-7/2=-1/2, which is not an integer

So, S = {4,6},{5,5},{5,7},{6,6}



a. Draw arrow diagrams for R, S, and T



R S



A B A B

T



A B

b. Indicate whether any of the relations R, S, and T are functions.

R, S, and T aren’t functions because element in A doesn’t associate with only one element of B.

6. Let A = {0,1,2} and let S be the set of all strings over A . Define a relation L from S to to   
𝑍𝑛𝑜𝑛𝑛𝑒𝑔 as follows: For every string s in S and every nonnegative integer n,   
 (𝑠, 𝑛) ∈ 𝐿 means that the length of s is n.  
Then L is a function because every string in S has one and only one length.   
Find L(0201) and L(12) .

Ans=

Given that,

(s, n) ∈ L, means that the length of s is n.

i.e., length of L(s) = n

in L(0202) , the length of the string 0202 is 4.

In L(12), the length of the string 12 is 2.

7. Define functions H and K from R to R by the following formulas: For all x ∈ R,  
𝐻(𝑥) = (𝑥 ― 2)2 and 𝐾(𝑥) = (𝑥 ― 1)(𝑥 ― 3) +1  
Does H = K? Explain why and verify them by the curve plots in Excel

Ans=

Given relation,

H(x) = (x -2)2

And k(x) = (x-1) (x-3) +1

Solving k(x),

K(x)= x(x-3)-1(x-3) +1

=x2 -3x-x+3+1

=x2 -4x+4

=(x-2)2

Since k(x)=H(x), therefore H=K