**1.For every equation E, if E is quadratic then E has at most two real solutions.**

a. All quadratic equations, have at most two real solutions.

b. Every quadratic equation, has at most two real solutions.

c. If an equation is quadratic, then it has at most two real solutions.

d. If E is a quadratic equation, then E has at most two real solutions.

e. For every quadratic equation E, has at most two real solutions.

**2. There is a real number whose product with every real number equals zero.**

a. Some has the property that its, product with every real number equals zero.

b. There is a real number a such that the product of a, with every real number is zero.

c. There is a real number a with the 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)**

**=** {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,(a,(y,p)), (a,(y,r))}

**b. (𝑅 × 𝑆) × 𝑇**

**c. 𝑅 × 𝑆 × 𝑇**

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

= {(a,x,p) ,(a,x,q), (a,x,r), (a,y,p) ,(a,y,q) ,(a,y,r)}

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

= {x,x,x,x,y}

= {x,x,x,y,x}

= {x,x,y,x,x}

= {x,y,x,x,x}

= {y,x,x,x,x}

**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)}.**

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

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

Here, A\*B

= {(4,5) (4,6) (4,7) (5,5) (5,6) (5,7) (6,5) (6,6) (6,7)}

From the given conditions,

R= {(5,5) (6,5) (6,7)}

S= {(4,6) (5,5) (5,7) (6,6)}

T= {(4,7) (6,5) (6,7)}

**Arrow Diagram for R**



**Arrow Diagram for S**



**Arrow Diagram for T**



Hence, Here are no functions as every X value should be associated with only Y value to be a function.

**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) .**

Here, Given that

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

i.e., L(s) = n

= In L (0201)

The length of string 0201 is 4.

L (0201) =4, since (0201,4) ∈ L

= In L (12)

The length of string 12 is 2.

L (12) =4, since (12,2) ∈ L

**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**

Here,

H(x)= (x-2)^2

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

= (x^2-4x+3+1)

= (x^2-4x+4)

= (x-2)^2

Hence, H=K. It is also further verified by the below excel curve points.

