Math Mania 2022 - Final Review Handout

Answers

Module 1 Solutions:

Question 1:

1. 45 + (-29)  
     
   45dec = 0101101bin  
   29dec = 0011101bin  
     
   1100010bin <- one’s complement  
    1bin +  
   1100011bin = -29dec <- two’s complement  
     
    0101101bin <- 45dec  
    1100011bin + <- -29dec  
   10010000bin   
     
   discard left bit:  
   0010000bin = 16dec = 10hex
2. (-121) + (-19)  
     
   121dec = 01111001bin  
     
   10000110bin <- one’s complement  
    1bin +  
   10000111bin = -121dec <- two’s complement  
     
     
   19dec = 00010011  
     
   11101100bin <- one’s complement  
    1bin +  
   11101101bin = -19dec <- two’s complement  
     
    10000111bin  
    11101101bin +  
   101110100bin <- extra bit required (use two’s complement to convert to decimal)  
     
   101110100bin = -140dec = -8Chex
3. 207 + 97  
     
   207dec = 0011001111bin  
   97dec = 0001100001bin +   
    0100110000bin = 304dec = 130hex
4. (-156) + 141  
     
   156dec = 010011100bin  
   141dec = 010001101bin  
     
   101100011bin <- one’s complement  
    1bin +  
   101100100bin = -156dec <- two’s complement  
     
   101100100bin  
   010001101bin +   
   111110001bin  
     
   000001110bin <- one’s complement  
    1bin +  
   000001111bin = 15dec<- two’s complement  
     
   111110001bin = -15dec = -Fhex

Question 2:

1. where X = 0, Y = 1
2. where P = 0, Q = 1, R = 0
3. where A = 0, B = 0, C = 0

Question 3:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **A** | **B** | **~A** | **~B** | **~A\*~B** | **(~A\*~B) + B** | **~A + B** |
| 0 | 0 | 1 | 1 | 1 | 1 | 1 |
| 0 | 1 | 1 | 0 | 0 | 1 | 1 |
| 1 | 0 | 0 | 1 | 0 | 0 | 0 |
| 1 | 1 | 0 | 0 | 0 | 1 | 1 |

Question 4:



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **P** | **Q** | **R** | **S** | **OUTPUT** |
| 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 1 | 0 |
| 0 | 0 | 1 | 0 | 0 |
| 0 | 1 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 1 | 0 |
| 0 | 1 | 0 | 1 | 0 |
| 1 | 0 | 0 | 1 | 1 |
| 1 | 0 | 1 | 0 | 1 |
| 0 | 1 | 1 | 0 | 0 |
| 1 | 1 | 0 | 0 | 1 |
| 1 | 1 | 1 | 0 | 1 |
| 1 | 1 | 0 | 1 | 1 |
| 1 | 0 | 1 | 1 | 1 |
| 0 | 1 | 1 | 1 | 0 |
| 1 | 1 | 1 | 1 | 1 |



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **RS** | **~RS** | **~R~S** | **R~S** |
| **PQ** | 1 | 1 | 1 | 1 |
| **~PQ** |  |  |  |  |
| **~P~Q** |  |  |  |  |
| **P~Q** | 1 | 1 |  | 1 |



1. P

Q  
  
P  
R  
  
P  
S

Module 2 Solutions:

Question 1:

Domain:

Range:

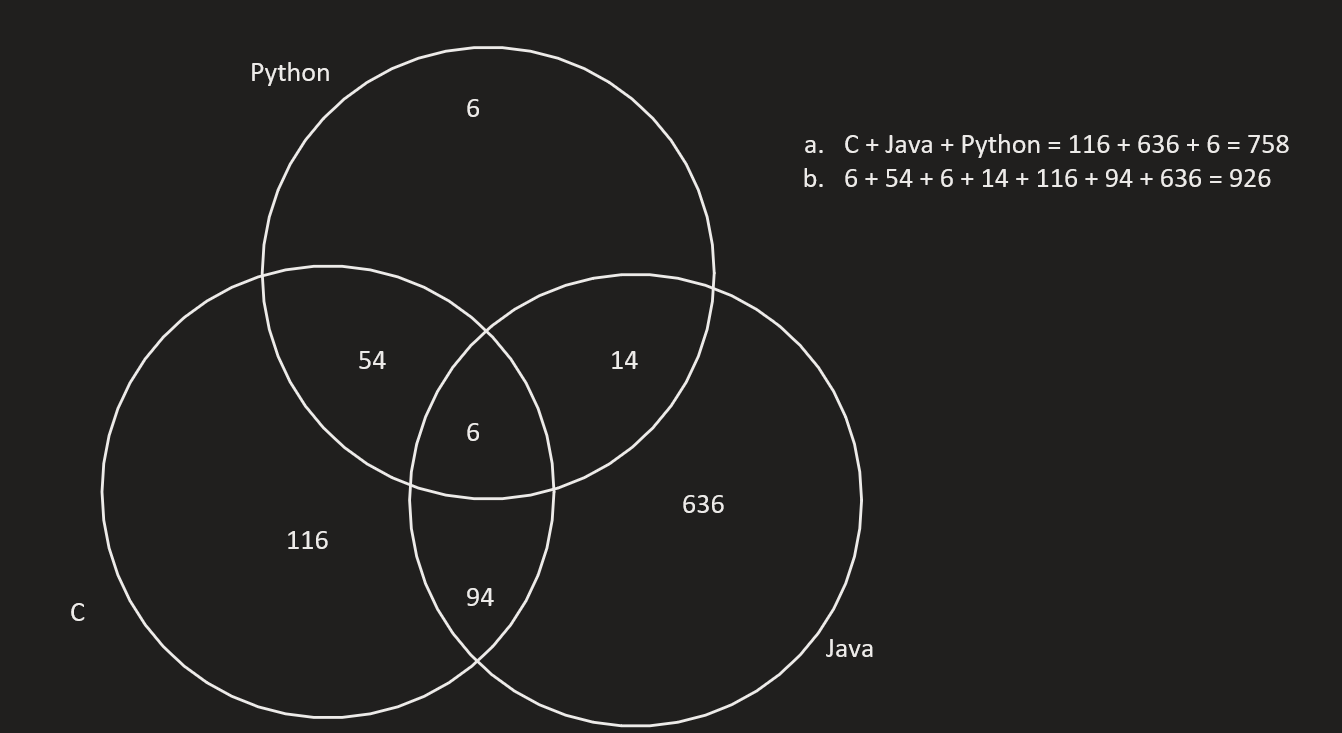
D: R:

Domain:

Range:

D: R:

Question 2:



Question 3:

a0 = 9

a1=

a2=

Question 4:

i = -1: 3

i = 0: 2

i = 1: 3

i = 2: 6

i = 3: 11

m = -1: -1

m = 0: -1

m = 1: 0

m = 2:

Question 5:

Diagram

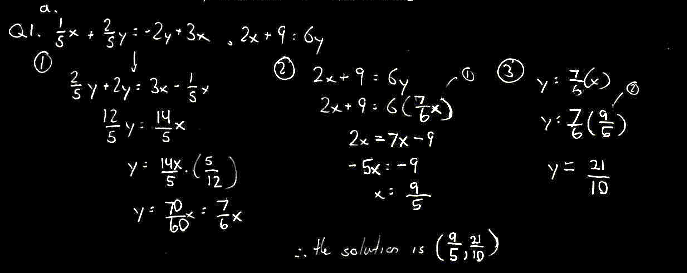
Description automatically generated

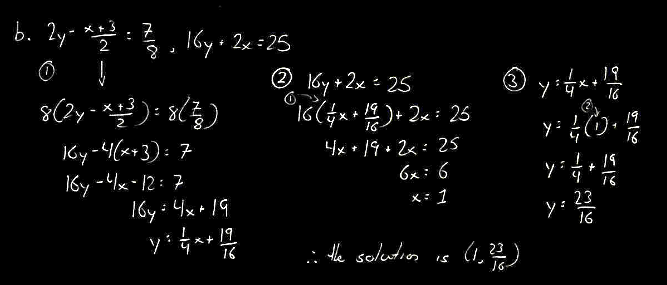
Question 6:

1. 2,8
2. 1
3. 8, 9, 10, 11, 12
4. Height = 3
5. 7 internal vertices (1, 2, 3, 5, 6, 7)

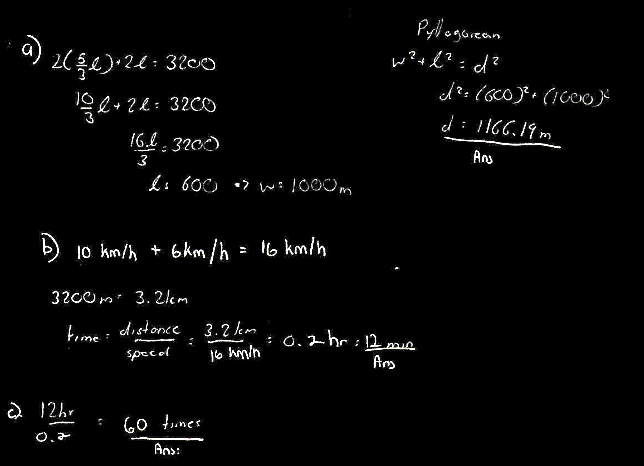
Module 3 Solutions:

Question 1:

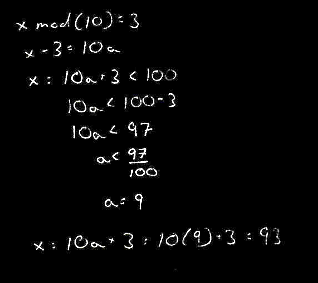


b)   


Question 2:



Question 3:



Question 4:

1. Let number be x

½(x)+3 = 5. (6-2)

½(x)+3 = 20

X = 34

1. Let the number be x

¼(x+3) = 8\*2-1

X=57

1. Sqrt(x+2)=16-7

Sqrt(x+2) = 9

X+2 = 3

X=1

Or

X+2 = -3

X=-5

But this is not possible as we can’t put the negative value in root

Module 4 Solutions:

Question 1:

1. AC-B
2. 3A+BC

a)AC=

AC-B =

b)BC =

3A+BC =

Question 2:

1. Inverse of p
2. Inverse of A

Question 3:

A screen shot of a black background

Description automatically generated

b)

A math equations on a white background

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A math equations on a white background

Description automatically generated

A math equations with numbers and symbols

Description automatically generated

Question 4.

A screenshot of a math problem

Description automatically generated

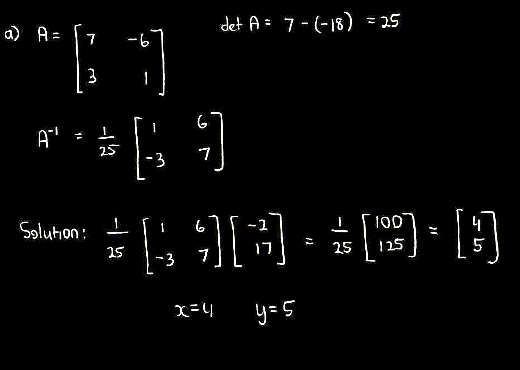
Answer -

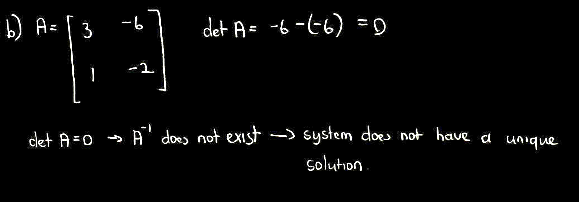
4\*=

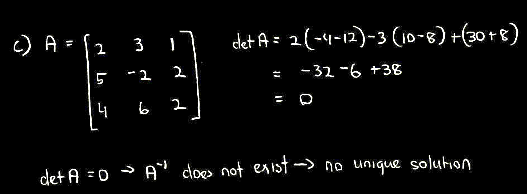
A white background with black text

Description automatically generated

Question 5:

Question 6:  
a)  


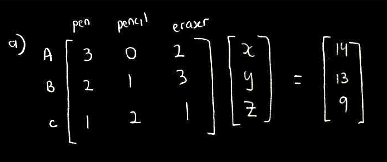
b)  


c)  


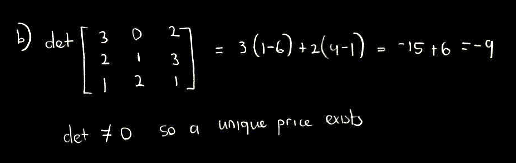
d)  
A picture containing text, electronics, keyboard, black

Description automatically generated

Question 7:  
a)



b)



c)

