Notes for mathematics UTS midterm exam:

https://biomath.weebly.com/uploads/3/0/2/7/30272185/1math2023.docx

https://biomath.weebly.com/uploads/3/0/2/7/30272185/2math2023.docx

https://biomath.weebly.com/uploads/3/0/2/7/30272185/i3math2023.docx

https://biomath.weebly.com/uploads/3/0/2/7/30272185/4math2023.docx

https://biomath.weebly.com/uploads/3/0/2/7/30272185/1sets.ppt

https://biomath.weebly.com/uploads/3/0/2/7/30272185/2propositions.ppt

https://biomath.weebly.com/uploads/3/0/2/7/30272185/3proofs.ppt

https://biomath.weebly.com/uploads/3/0/2/7/30272185/4sequences.ppt

https://biomath.weebly.com/uploads/3/0/2/7/30272185/5relations.ppt

https://biomath.weebly.com/uploads/3/0/2/7/30272185/6primes.ppt

https://biomath.weebly.com/uploads/3/0/2/7/30272185/7combinatorics.ppt

https://biomath.weebly.com/uploads/3/0/2/7/30272185/8probability.ppt

https://biomath.weebly.com/uploads/3/0/2/7/30272185/9relations.ppt

1. How many subsets are there in a set of T elements?

Since order does NOT matter, the total number of subsets of a set is sum of all the combinations, which means 2T, where T is the number of elements (cardinality) of the set.

2. Give truth tables of NOT, AND, OR and their arithmetic equivalents.

p NOT p = p +(-1)p

0 1

1 0

p q p AND q = pq

0 0 0

0 1 0

1 0 0

1 1 1

p q p OR q = p+q-pq

0 0 0

0 1 1

1 0 1

1 1 1

3. Give expression of implication through NOT, AND, OR.

H R H🡪R

0 0 1

0 1 1

1 0 0

1 1 1

Using disjunctive normal form H🡪R = NOT H OR R

4. Compare truth tables of implication, conversion, inversion, contraposition.

Implication = contraposition

Conversion = inversion

5. Calculate P(T,L)=

Question:

In how many ways you can write k?

2! or 3!, or 4!

6. Solve the simultaneous linear equations. Do the matrix operations.

x and y are unknows variables, we must find they from solving simultaneous equations.

a, b, c, d, e, f are known numbers.

ax+by = c

dx+ey = f

Substitution:

Elimination:

eax + eby = ec

bdx + bey = bf

eax – bdx = ec – bf

(ea– bd)x= ec – bf

Cramer rule says that

Here

= ae - bd

= ce - bf

= af - cd

det is determinant.

Finding inverse matrix

If you have matrix then the inverse matrix is

If you have matrix then the inverse matrix is

This is the same as given by Cramer Rule.

Product of matrix and its inverse matrix gives multiplicative identity matrix

If you have inverse matrix, then you can multiply left and right sides of your simultaneous equations by inverse matrix and get the answer.

Matrix algebra

Number times matrix

Sum of matrices

i,j = 1,2.

Minus is similar to plus for matrices.

i,j = 1,2.

Additive identity matrix is

Multiplicative identity matrix is

To multiply matrices A and B matrix A must have the same number of columns and B rows.

7. Rotate vector (m10, m20) by a degrees anticlockwise.

a = s mod 25

A = πa/180

8. Find HCD and LCM of e+4 and L+4.

Find Highest Common Divisor and Lowest Common Multiple of e+4 and L+4.

Use minimum and Maximum powers of the prime factors.

Question:

Calculate the largest prime number.

n = 13

For i = 2 To Int(Sqr(n))

If n Mod i = 0 Then GoTo 1

Next i

MsgBox "prime"

GoTo 2

1 MsgBox "not prime"

2 Label2 = 2

9. Convert T to e+2and L+2counting systems.

s = 23123456

T = s mod 100

L = s mod 10

e = s mod 8

n = T

b = L+2

d1 = n Mod b ^ 1

MsgBox d1

d2 = (n Mod b ^ 2 - d1) / b ^ 1

MsgBox d2

d3 = (n Mod b ^ 3 - b ^ 1 \* d2 - d1) / b ^ 2

MsgBox d3

d4 = (n Mod b ^ 4 - b ^ 2 \* d3 - b ^ 1 \* d2 - d1) / b ^ 3

MsgBox d4

d5 = (n Mod b ^ 5 - b ^ 3 \* d4 - b ^ 2 \* d3 - b ^ 1 \* d2 - d1) / b ^ 4

MsgBox d5

d6 = (n Mod b ^ 6 - b ^ 4 \* d5 - b ^ 3 \* d4 - b ^ 2 \* d3 - b ^ 1 \* d2 - d1) / b ^ 5

MsgBox d6

d7 = (n Mod b ^ 7 - b ^ 5 \* d6 - b ^ 4 \* d5 - b ^ 3 \* d4 - b ^ 2 \* d3 - b ^ 1 \* d2 - d1) / b ^ 6

MsgBox d7

'd8 = (n Mod b ^ 8 - b ^ 6 \* d7 - b ^ 5 \* d6 - b ^ 4 \* d5 - b ^ 3 \* d4 - b ^ 2 \* d3 - b ^ 1 \* d2 - d1) / b ^ 7

'MsgBox d8

'd9 = (n Mod b ^ 9 - b ^ 7 \* d8 - b ^ 6 \* d7 - b ^ 5 \* d6 - b ^ 4 \* d5 - b ^ 3 \* d4 - b ^ 2 \* d3 - b ^ 1 \* d2 - d1) / b ^ 8

'MsgBox d9

'd10 = (n Mod b ^ 10 - b ^ 8 \* d9 - b ^ 7 \* d8 - b ^ 6 \* d7 - b ^ 5 \* d6 - b ^ 4 \* d5 - b ^ 3 \* d4 - b ^ 2 \* d3 - b ^ 1 \* d2 - d1) / b ^ 9

'MsgBox d10

Question:

Give prime factorization of s.

10. Give the histogram of tossing L+2 fair coins, the first e+3 digits of π.

0:1

1:1

0:1

1:2

2:1

0:1

1:3

2:3

3:1

1

11

121

1331

3.141592654

0:0

1:2

2:1

3:1

4:2

5:2

6:1

7:0

8:0

9:1

11. Find the equation for the sequence: 1, 4, 9, 16, 25, 36, 49, …

n2

12. Solve the Graceful Graph Problem for *(e+3)* vertices.

(0,1), (1,3), (0,3)

(5,6), (0,2), (2,5), (2,6), (0,5), (0,6)

(8,9),(0,2),(2,5),(5,9),(0,5),(2,8),(2,9),(0,8),(0,9)

http://discrete4math.weebly.com/uploads/2/5/3/9/25393482/code5better.txt

http://discrete4math.weebly.com/uploads/2/5/3/9/25393482/code6.txt

http://discrete4math.weebly.com/uploads/2/5/3/9/25393482/7code7.txt

http://discrete4math.weebly.com/uploads/2/5/3/9/25393482/8code.txt

http://discrete4math.weebly.com/uploads/2/5/3/9/25393482/9code.txt

http://discrete4math.weebly.com/uploads/2/5/3/9/25393482/10code10.txt

http://discrete4math.weebly.com/uploads/2/5/3/9/25393482/11code11.txt

http://discrete4math.weebly.com/uploads/2/5/3/9/25393482/12code12.txt

http://azspcs.com/Contest/GracefulGraphs