

S1: Show no work.

a A multivariate polynomial, where each monomial has the same degree, is **Circle**: monogamous manic monic polyandrous delicious atrocious level flat uniform unitary Unitarian utilitarian homogeneous expialadocious penultimate smooth

b Permutation $\lambda \in \mathbb{S}_{12}$ is

A	2	3	4	5	6	7	8	9	T	J	Q
8	T	3	6	J	2	Q	A	9	5	4	7

With the tokens ordered as $A < 2 < 3 < \dots < J < Q$, the canonical cycle notation of λ is

$\text{CCN}(\lambda) =$ _____

The sign of λ is (circle a value) $\text{Sgn}(\lambda) = +1 \quad -1$.

c Suppose C and A are 3×3 matrices s.t $\text{Det}(C) = \frac{1}{2}$ and $\text{Det}(A) = 5$. Then

$\text{Det}(C^{-1}AC^t A^t AC^t) =$ _____

d Over field \mathbb{Z}_{11} , consider matrix

$$A := \begin{bmatrix} 16 & 10 & -8 \\ 3 & 37 & 12 \\ -33 & 27 & 23 \end{bmatrix}.$$

Then

$$A^{-1} = \begin{bmatrix} & & \\ & & \\ & & \end{bmatrix}.$$

Write entries as symmetric-residues, i.e, in $[-5 .. 5]$.

e

Let \mathcal{L} be this list of 8 symbols: $A, G, R, T, U, \alpha, \beta, \omega$.

In matrix-eqn $\begin{bmatrix} R & U & G \\ T & A & \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} \alpha \\ \beta \\ \omega \end{bmatrix}$, Cramer's Rule

writes x_3 as ratio $f(\mathcal{L})/q(\mathcal{L})$ of polynomials

$f(\mathcal{L}) =$ _____

and $q(\mathcal{L}) =$ _____

f Let P be the 2×2 matrix realizing ortho-projection on the $y = 2x$ line through the origin. Then $P =$

$$\begin{bmatrix} & \\ & \end{bmatrix}.$$

OYOP: Essay: *Write on every second line, so that I can easily write between the lines.*

S2: **i** On your essay-paper, write “A 5×7 matrix M is in Reduced Row-Echelon Form IFF ...” and complete the paragraph (with one or more sentences) to give a formal defn of RREF.

ii Give a careful proof of the...

1: RREF Uniqueness Theorem. Consider two 5×7 RREF matrices A and B . If A is row-equivalent to B , then $A = B$. \diamond

Start your argument with “Proof of the RREF Uniqueness Thm” and end it with “QED”.

End of Class-S

S1: _____ 155pts

S2: _____ 65pts

Total: _____ 220pts

NAME: _____ Ord: _____

HONOR CODE: *I have neither requested nor received help on this exam other than from my professor.*

Signature: _____