Sets and Logic
MHF3202 2787

Class-A

Prof. JLF King
Wednesday, 26Sep2018

A4:

a Prof. King believes that writing in complete, coherent sentences is crucial in communicating Mathematics, improves posture, and whitens teeth. $\boxed{\text{Circle}}$ one:

True! **Yes!** ***wH'at S a?sEnTENcE***

b In $\left[5x^2 + 4y + z^3 + 7\right]^{20}$, compute these coeffs:

Coeff$(x^6 z^8) =$ ______ .

Coeff$(y^5 z^6) =$ ______ .

[You may write answers as a product numbers, powers and multinomial-coeffs.]

c The physics lab has atomic *zinc*, *tin*, *silver* and *gold*. I'm allowed to take 6 atoms, so I have [expressed as single integer] ______ many possibilities.

d We consider binrels on $\Omega :=$ Stooges $:= \{M, L, C\}$. There are ______ **Anti-reflexive** binrels, and ______ **Reflexive** binrels, and ______ **Symmetric** binrels. The number of **strict total-orders** is ______ .

e The ***Threeish-numbers*** comprise $\mathcal{T} := 1 + 3\mathbb{N}$.
$\mathcal{T}$-number $385 \stackrel{\text{note}}{=\!=} 35\cdot 11$ is $\mathcal{T}$-*irreducible*: T F

Threeish $N := 85$ is **not** $\mathcal{T}$-*prime* because $\mathcal{T}$-numbers $J:=$ ______ and $K:=$ ______ satisfy that $N \bullet\!| \, [J\cdot K]$, **yet** $N \nmid J$ and $N \nmid K$.

f Sequence $\vec{\mathbf{L}} := (L_n)_{n=0}^{\infty}$ is defined by $L_0 := 5$, $L_1 := 4$, and $\boxed{\forall n \in \mathbb{N}\colon\ L_{n+2} = L_{n+1} + 6L_n}$. This implies $\boxed{\forall k \in \mathbb{N}\colon\ L_k = [P\cdot\alpha^k + Q\cdot\beta^k]}$, for real numbers $\alpha=$ ______ $< \beta=$ ______ .

OYOP: *In grammatical English **sentences**, write your essay on every 2^{nd} or 3^{rd} line (usually), so that I can easily write between the lines.* Please number the pages "1 of 57", "2 of 57"... (or "1/57", "2/57"...) I suggest you put your name on each sheet.

A5: Interval-of-integers $\mathbf{J} := [201 \,..\, 300)$ has 99 elements. A subset $S \subset \mathbf{J}$ is ***Big*** if $|S| = 51$. Subset $S \subset \mathbf{J}$ is ***Perfect*** if there exist *distinct* members $x,y \in S$ st. $x + y = 500$.

Prove that Big $\Rightarrow$ Perfect. [*Hint:* PHP. *Carefully* specify what your pigeon-holes are.]

A4:	___ ___ ___	120pts
A5:	___ ___	45pts
Total:	___ ___ ___	165pts