Staple!

Ord: ___ ___

Sets and Logic
MHF3202 8768

Class-V

Prof. JLF King
01Feb2017

V5:	___ ___	75pts
V6:	___ ___	45pts
V7:	___ ___	45pts
Total:	___ ___ ___	165pts

HONOR CODE: *"I have neither requested nor received help on this exam other than from my professor (or his colleague)."*
Name/Signature/Ord

Ord: ....

V5: Short answer. Show no work.
Write **DNE** in a blank if the described object does not exist or if the indicated operation cannot be performed.

___ **a** Prof. King believes that writing in complete, coherent sentences is crucial in communicating Mathematics, improves posture, and whitens teeth. Circle one:

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

___ **b** In $[5x^2 + y + z^3]^{20}$, compute these coeffs:

$\text{Coeff}(x^6 z^8) =$ ....

$\text{Coeff}(y^5 z^6) =$ ....

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

$\alpha=$ .... $< \beta=$ ....

OYOP: *In grammatical English* ***sentences****, write your essays on every* ***third*** *line* (usually), *so that I can easily write between the lines.* Start each essay on a new sheet-of-paper. Please number the pages "1 of 57", "2 of 57"... (or "1/57", "2/57"...) I suggest you put your name on each sheet.

V6: Interval-of-integers $\mathbf{J} := [101 .. 200)$ 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. $x + y = 300$.
Prove that Big $\Rightarrow$ Perfect. [*Hint:* PHP. *Carefully* specify what your pigeon-holes are.]

V7: Let $T_d := 18^d + 1$ for $d = 3, 5, 7, 9, 11, \ldots$. Prove that each such T_d is composite.
[*Hint:* Look at T_{Odd} mod-N, for an appropriate N.]

End of Class-V