Staple!

Ord: ___ ___

Combinatorics
MAD4203 3214

Class-C

Prof. JLF King
Wed., 15Nov2017

Welcome. Write **DNE** in a blank if the described object does not exist or if the indicated operation cannot be performed.

Use $\mathcal{S}(N,K)$ for 2Stirling #s, and use $\mathbf{c}(N,K)$ for the signless-1Stirling #s.

C1: Short answer. Show no work.

a A *minimum* requirement for an LOR (letter-of-recommendation) from Prof. K is two courses. Circle:

Yes **True** **Darn tootin'!**

b Written with $\sum$ notation, the number of derangements of $[1..17]$ is: ______________.

c Let $\mathbb{D}_N$ be the set of derangements in $\mathbb{S}_N$. Then $|\mathbb{D}_4| =$ ______________.

The *set* of ***good*** k, st. $\mathbb{D}_k$ has both odd perms *and* even perms, is ______________.

d There are ______________ digraphs on vertex-set $[1..N]$. The number of ***tournaments*** (*complete* diagraphs) on $[1..N]$ is ______________.

e For posint N, let G_N be K_N (complete graph) but with one edge removed (so G_N has N vertices). Its chromatic polynomial is $\mathcal{P}_{G_N}(x) =$ ______________.

[You may use rising/falling factorial in your answer, if you wish.]

In particular, $\mathcal{P}_{G_4}(x) =$ ______________.

C2: OYOP: *In grammatical English sentences, write your essay on every third 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.

i Prove that every tourament, G, on $[1..N]$ admits a ***Hamiltonian*** path; a path that visits each vertex exactly once (so the path will have $N-1$ edges).

ii Prove that every *DiG-connected* N-tourament, G, admits a ***Hamiltonian*** *cycle*; the cycle will have N edges.

End of Class-C

C1:	___ ___ ___	155pts
C2:	___ ___	70pts
Total:	___ ___ ___	225pts

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

Ord: ______________