Text	book	Reading	Chapters: 1, 2,	Appendix B	Due Date: Friday, January 22, 2021 by 11:59pm
Week	Date	Sections from FS2009	Part/ References	Topic/Sections	Notes/Speaker
Inst	ruc	tions.3	Combinatorial	Symbolic methods	
2 3	${{{{{\rm Uplo}}}\atop{{{\rm Uplo}}}^{21}} {{{\rm recei}}}}$	1.4, 1.5, 1.6 ad a copy 11.1, 11.2, 11.3 ved via em	Structures FS: Part A 1 A 2 Of Whith assignme and and and and a	Unlabelled structures ent, including a Labelled structures I	cover page, (pdf format) to the Crowdmark link you've
4	28	11.4, 11.5, 11.6	(self study)	Labelled structures II	
• 5	Corre	ectness, Clo	rity, & Concisen	ess of presentat	ion are reflected in the grading. Asst #1 Due
6	Colla derst	borative d anding & 1	iscussion on the results. ^{self} studylAcknowl	assignment in Multivariable GFs edge colleagues	encouraged, but the write-up should reflect you own un- , TA, or other assistance you received.
7	19	IV.3, IV.4	Analytic Methods	Complex Analysis	
Que		niš ^{5 V.1}	FS: Part B: IV, V, VI Appendix B4 Stanley 99: Ch. 6	Singularity Analysis	
7	INOV Z		Handout #1	Asymptotic methods	ASSI #2 Due
ı 1 .	Cons	ider the st	arting arrangem	ent of tiles for th	hê®Swap puzzle in Figure 1. In each of the following cases,
	clæar	lyawrite ou	it the moves you	areumakango. Fo	omexample, make a table of the positions where the first
	røwi	is _l the start	ing position and	leach row is the	e _M result of your move applied to the configuration in the
11	previ ²⁰ solve	ious row. I d the puzz	n essence create Random Structures leand Limit Laws	a record of you Discrete Limit Laws	$\mathbf{r}_{\text{Sophie}}$ so anyone reading it will see exactly how you
12	23 (a)	Solve the p	FS: Part C Durating Uzzlegusing only	Combinatorial Istances of discrete of	the form: <i>swap the contents of any two boxes</i> .
	²5 b)	Solve the \mathbf{j}	ouzzle using only	Continuous Limit Laws y legal moves of	$f^{Marni}_{\text{the form: the contents of any box can only be swapped}$
13	30	with box 1.	_	Quasi-Powers and Gaussian limit laws	Sophie
	(c)	Solva tha r	uizzle using only	logal moves cor	sisting of 3-cyclos, nick three hores and cycle the contents

14 (c) Solve the puzzle using only legal moves consisting of 3-cycles: pick three boxes and cycle the contents either to the right (clockwise) or to the left (counterclockwise).

1	2	3	4	5	6
1	6	4	2	3	5

Figure 1: Swap position for Exercise 1.

2. Consider the variation of the Swap puzzle using only legal moves consisting of 3-cycles: *pick three boxes and cycle the contents either to the right (clockwise) or to the left (counterclockwise)*. Show that, starting with the arrangement given in Figure 2, it is possible to put the numbers in each of the orders:
(a) 123465, and (b) 612345.

(c) Try to put it in the solved state: 123456. Were you able to? If so, present your list of moves. If not, how close to the solved state could you get?



Figure 2: Swap position for Exercises 2.

- 3. (Understanding Set-Builder Notation) Determine all the elements of the following sets.
 - (a) $\{1 + (-1)^n \mid n \in \mathbb{N}\}$
 - (b) $\{n \in \mathbb{N} \mid n \leq 25 \text{ and } n \text{ is divisible by } 3\}$
 - (c) $\{n \in \mathbb{N} \mid n \leq 25, n \text{ is prime, and } 2n+1 \text{ is divisible by } 3\}$
- 4. Show that integers $a, b, d \in \mathbb{Z}$, if $d \mid a$ and $d \mid b$ then $d \mid (a + b)$.

Week Date Sections Part/References Topic/Sections Notes/Speaker 5. For each motivative following pairs of numbers a, b below compute gcd(a, b) by hand (see Example B.1). In

- 1 each case use the Extended Euclidean Algorithm to find integers u and v such that gcd(a, b) = ua + bv.
- (Hint: Follow the example done in the paragraph before Theorem B.1.4.)
- 2 14 I.4, I.5, I.6 FS: Part A.1, A.2 Unlabelled str
- $\begin{array}{cccc} \mathbf{3} & 2\mathbf{a} & 30\mathbf{b}^{1}, \mathbf{7}\mathbf{6}2^{1.3} & \text{Conterval} \\ \mathbf{4} & 2\mathbf{8} & \|\mathbf{4} & \|\mathbf{5} & \|\mathbf{4} & [\text{self study}] \\ \mathbf{5} & \|\mathbf{5}\| & \|\mathbf{5$
- 4
 28
 II.4, II.5, II.6
 Iself study!
 Labelled structures II

 2
 10
 10
 10
 10
- 7. Are there integers and y that satisfy all $\partial f(x) + 444y = 1$? If yes, determine a solution. If no, give a reason why not, iv. Analytic Methods Complex Analysis
- 7 19^{-5} 10^{-3} 10^{-3} 10^{-3} Analytic Methods Complex Analysis 8. If $d \mid ab does it followwith at d \mid a opinbul drive Analysis$
- **8.** \mathbf{M}^{a} $d \mid ab$ does it \mathbf{IO}_{A} $\mathbf{D}_{\mathbf{W}}$ $\mathbf{M}_{\mathbf{U}}$ $\mathbf{L}_{\mathbf{D}}$ \mathbf{A} $d \mid a$ \mathbf{OP} $\mathbf{M}_{\mathbf{U}}$ $\mathbf{$

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- 9. Use the Extended Factification Algorithm to Show the following: ⁹ VI.1 (self-study) Sophie
- ¹⁰ (a) Let gcd(a, b) = d and suppose that $c \mid a$, and $c \mid d$.
 - (b) If $d_1 ab$ and gcd(d, a) = 1, shown that $d_0 bb Marni$
- 10. Use Theorem B. $\frac{3}{2}$ and $\frac{3}{2}$ by the first of the second s
- **11.** $\mathbf{\hat{F}}^{3}$ and $\mathbf{a}^{11} m$ such that $\mathbf{\hat{I}}^{848} \equiv 1914$ instance on biscrete presentations) Mariolys
- 12. When ³²/₂²⁵ is expressed as an ^{1Continuous Limit Laws} integer, What is last digit (i.e. the ones digit) of 3²⁰²⁷? What are the last dual-two digits of 3²⁰²⁷? What are the last ^{Quasi-Powers and} ^{Quasi-Powers and} ^{Sophie}
- 18. Ised 10+ $2 + 2^2 + 2^3 + \cdots$ Presentations 2^{2021} divisible by as if your answer.