WEEK 02 EXAM TOPICS LIST

dont know	know a bit	OK	good!	master	COMS 311 TOPICS		
1	2	3	4	5	**BIG-OH**	**week2**	week1
					Basics		x
					Definitions of big-oh, omega, theta c>0, n>=0 (7 things)		x
					big-omega		x
					big-theta		x
					Intuition/understanding (graph)		x
					tighter and weaker bounds	x	x
					how to prove O/Omega/Theta techniques		x
					for polynomials choose c >sum of coeff or coeff for omega		x
					for same type compare exponents		x
					take log		x
					Application to Algorithms		x
					ram model (vs actual)		x
					instances and runtime graphs	x	x
					WCET, BCET, ACET	x	x
					Big-oh of code segments	x	x
					problem complexity and algorithmic complexity		x
					code examples of different Os		x
					Big-oh in real world	x	
					real code times (matrix mult)	x	
					effect of cache/pipelining etc	x	
					choosing algo in real-world vs big-Oh	x	
					constants might matter more in real world than O	x	
					easier implementation might make the diff	x	
					Dominance Relationships		x
					logs beat constants		x
					poly beats all logs		x
					exp beats all poly		x
					fact beats all exp		x
					n^n beats fact		x
1	2	3	4	5	**DATA STRUCTURES**		
					Basic	x	x
					arrays (sorted/unsorted)	x	x
					linked lists (singly/doubly; sorted/unsorted)	x	x
					comparison of arrays and linked lists	x	x
					Basic Abstract Data Types	x	
					Stack, Queue (implementations using array/linkedlists)	x	x
					comparison of operations of diff impl of stack/queue	x	x

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						reasons for differences	x	x
						Dictionaries	x	
						Hash Tables	x	
					Other ADTs		x	
						Binary Search Trees	x	
						Priority Search Queues	x	
						Heap impl	x	
					Storing points, graphs, sets etc		x	
						graphs	x	
						sets	x	
					big-oh of operations on data structures		x	
					algorithms on data structures (BST, HEAP etc)		x	
1	2	3	4	5	**P-NP**			
					Intro Concepts			x
						the diagram and four classes of problems		x
						informal (solvable, probab intract, provably intract, prov unsolvable)		x
						examples of problems in four classes		x
						Halting Problem		x
						Hamiltonian Cycle Enumeration problem		x
						Hamiltonian Cycle Search problem		x
						Independent Set problem		x
						Search/Sort problems		x
					Classes of problems			
						Undecidable (prove Halting problem is undecidable)		x
						P		x
						NP		x
						prove P is a subset of NP		
						NP-Complete (probably intractable class)		x
						why if a NP-C problem is in P, then P=NP		
						provably intractable classes		x
						NP-Hard problems		
1	2	3	4	5	**PROOF TECHNIQUES**			
					Why is proving important?			x
						Job selection problem		x
						solutions to JS problem		x
						why is proving so important?		x
					CALCULUS			PreReq
						propositional logic rules		PreReq

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						predicate logic rules		PreReq
						form of deduction proofs		PreReq
					DIFFERENT TECHNIQUES		x	PreReq
						contradiction (and correct form)	x	PreReq
						induction (form)	x	PreReq
						direct proof (see form of deduction proofs)	x	PreReq
						trivial/vacuous	x	PreReq
						contrapositive	x	PreReq
					EXAMPLES IN CLASS			PreReq
						contradiction (and correct form)		PreReq
						induction (form)		PreReq
						direct proof (see form of deduction proofs)		PreReq
						trivial/vacuous		PreReq
						contrapositive		PreReq
					Proofs in class			
						Halting problem is undecidable	x	PreReq
						VC <=p IS and IS <=p VC		
						select jobs satisfies greedy choice + opt substructuring		
1	2	3	4	5	**ALGORITHMIC TECHNIQUES**			
					BRUTE FORCE TECHNIQUES			
						search space for different problems	x	x
						recursion tree for brute force approach	x	x
						back track algo from text book	x	x
						iterative way to generate all subsets		
						recursive way to generate all subsets	x	x
						recursive way to generate all perms	x	x
						recursive way to gen size k subsets	x	x