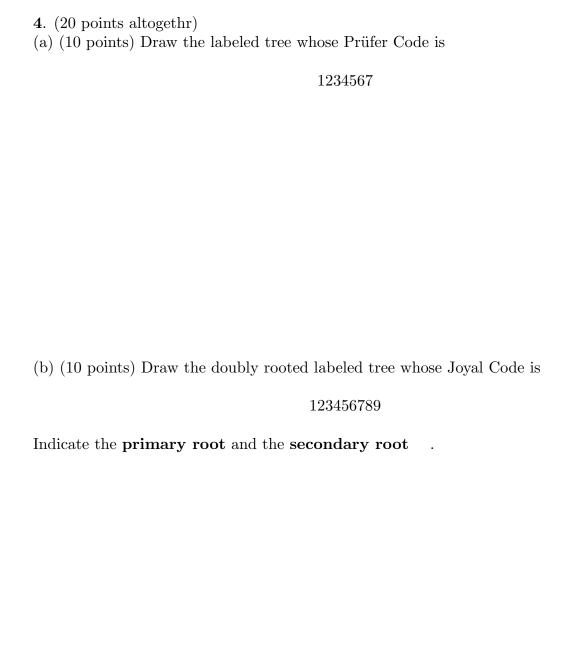
NAME: (print!)									
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MAT	MATH 428 (2), Dr. Z., Exam 1, Thurs. Oct. 21, 2025, 10:20-11:40pm, TILLETT-251								
No C work	ME YOUR FINAL ANSWER(S) TO EACH PROBLEM alculators! No books! No Notes! To ensure maximum credit, organize your leatly and be sure to show all your work. We write below this line								
1.	(out of 10)								
2.	(out of 10)								
3.	(out of 20)								
4.	(out of 20)								
5.	(out of 20)								
6.	(out of 10)								
7.	(out of 10)								
tot.:	(out of 100)								

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1. (10 points) Prove that $K_{3,3}$ is non-planar.

2 . (1	l0 points	s altogeth	er) (a) (5	points) I	Oraw the	Petersen	graph	
(b) (5 points) Find a	Eulerian c	eycle, or e	explain w	hy it doe	es not exis	st.

${f 3.}$ (20 points altogether) (a) (3 points) Define what it means for a simple graph to be $Hamiltonian$
(b) (10 points) State, but do not prove, Ore's theorem about a sufficient condition for a simple graph to be Hamiltonian
(c) (7 points) State Dirac't theorem about a sufficient condition for a simple graph to be Hamiltonian, and show how it follows from Ore's theorem.



5 . (20 points a	altogether) (a) (10	points) Draw al	$1 ext{ the } unlabeled \ i$	trees with 5 v	vertices
(b) (10 points) total number?	For each of them,	, state how man	ıy ways can you	label them.	What is the

6 . (10 points altotether) (a)	(2 points) D	Oraw the g	graph ⁻	whose s	set of	vertices	is {	a, b, c	c, d, e
and	whose set of edges is									

$$\{\{a,b\},\{b,c\},\{c,d\},\{a,d\},\{a,c\}\}$$
.

(b) (8 points) Draw all its spanning trees (if they exist, if not explain why), and if they do not exist draw all the spanning forests.

7. (10 points) Prove that if G is a bipartite graph, then every cycle has even length.