Practice Final Exam 2

Math 145, Spring 2019

Name: _____

Student ID: _____

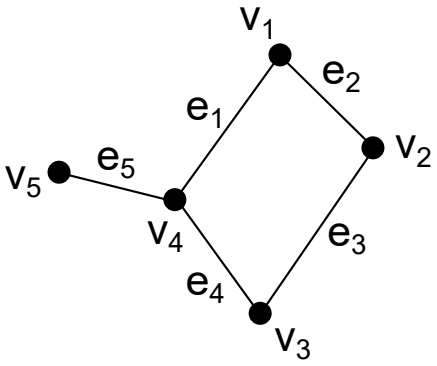
Every solution must contain an explanation written in words supporting your numerical solution to receive credit.

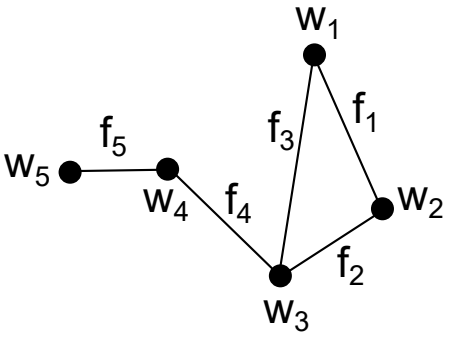
You do not need to simplify numerical expressions for your final answers (e.g. you can write $2^8 \cdot 4!$ instead of multiplying out to 6144.)

If you need extra space for your solutions, there is an extra page at the back of the exam. If you need extra space for any problem, write CONTINUED IN EXTRA SPACE on the page where the problem is given to you. In the extra space write the problem number that you are solving in that space.

Problem 1: Construct the labeled tree that corresponds to the Prüfer code 24602337.

Problem 2: For the following pair of graphs, either prove they are isomorphic or prove they are not isomorphic.

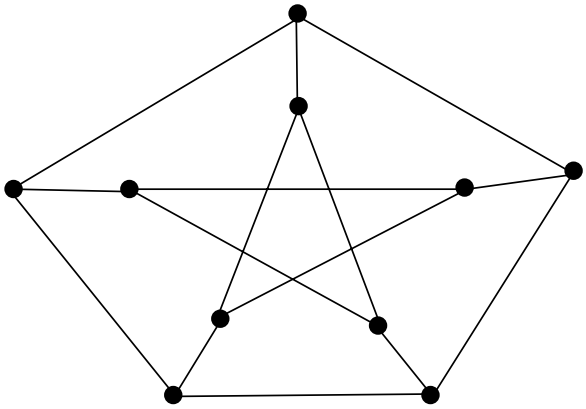




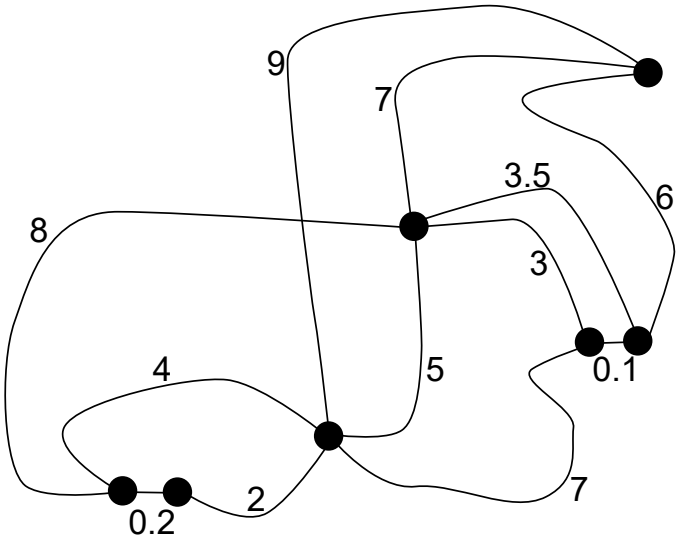
Problem 3: Suppose G is a graph with no cycles. Let e be an edge in G. Let G' be the graph obtained from G by deleting the edge e. Prove that G' is not connected.

Problem 4: A dance teacher is planning a dance recital for her 18 students. There will be 5 performances. Each student must dance in exactly one performance. Each performance must have at least one dancer. How many ways are there for the teacher to split up the students into the 5 different performances?

Problem 5: Prove that the following graph is not planar.



Problem 6: Find the minimal cost spanning tree for the following weighted graph. Draw the spanning tree and determine its total cost.



Problem 7: How many subsets of $\{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$ contain *at least two* elements which are multiples of 3?

Problem 8: Give the proof for the statement (directly from the definitions) that if T is a tree (a connected graph with no cycles) then T has a leaf (a vertex of degree 1).

Problem 9: A simple graph G is called *regular* if every vertex has the same degree. Suppose G is a connected simple graph with 22 edges which is regular. How many vertices can G have?

Extra Space:

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