

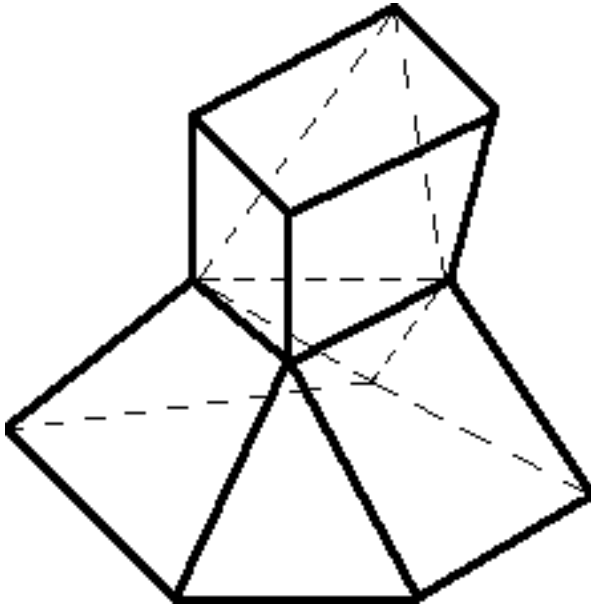
Math. 103 - Processes of Mathematical Thought
Prof. Mario Borelli
Exam III – Tuesday, April 21, 1998

NOTE: This is an **OPEN book** exam. This means you **MAY** use any notes, books, pocket calculators or any other learning aids you have brought with you. What you **MAY NOT** use is the brain of people sitting around you. **You are under the University's Honor Code**, and therefore are pledged to hand in work which is entirely your own. Speaking of work, make sure you **show all of your work**, since questions will be graded with the possibility of earning partial credit; in addition, the instructor tends to look incredulously at correct answers without any work showing how they have been obtained. Finally, **WRITE ALL OF YOUR ANSWERS AND EXPLANATIONS IN THE BLUE BOOKLET.**

Make sure you have two (2) pages of questions.

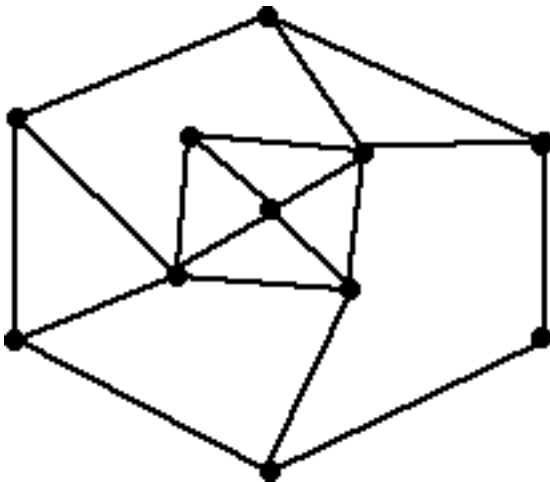
The exam has four (IV) questions

I. (10 pts.) This question deals with the solid shown in the figure below.



1. (4 pts.) Verify Euler's formula for the solid.
2. (6 pts.) Draw the planar representation of the solid.

II. (10 pts.) This question deals with the planar representation (of a solid) shown in the figure below.



1. (5 pts.) Verify Euler's formula for the solid.
2. (5 pts.) Identify precisely how many triangles, quadrilaterals, pentagons, hexagons, etc. constitute the faces of the solid.

III. (50 pts.) Some of the solids defined below exist, some do not. For those solids which you believe **DO** exist **compute NV, NE and NF (4 pts.)**, then **draw their planar representation (4 pts.)**. For those solids which you believe do NOT exist, **explain the reason for your belief.**

1. The faces of the solid consist exactly of three (3) triangles, two (2) quadrilaterals and one (1) pentagon.
2. The faces of the solid consist exactly of three (3) triangles, two (2) quadrilaterals and two (2) pentagons.
3. The solid has exactly fourteen (14) edges, and its faces consist solely of pentagons.
4. The solid has exactly fifteen (15) edges, and its faces consist solely of triangles.
5. The solid has exactly ten (10) vertices. The faces of the solid consist solely of quadrilateral and pentagons, three of which meet at each vertex.
6. The solid has exactly eight (8) vertices. The faces of the solid consist solely of quadrilateral and pentagons, four of which meet at each vertex.

IV. (30 pts.) This question refers to the four rankings of five fruits shown below (1 = high, 5 = low). (*Sorry, don't know any fruit whose name starts with an "e" !*)

	P	Q	R	S
Apples	1	2	4	3
Bananas	2	3	2	4
Cherries	3	2	3	5
Dates	5	4	1	2
Figs	4	5	4	1

- (A) (10 pts.) Construct the ranking matrix for each of the four rankings.
- (B) (10 pts.) Which ranking (other than **P** !) is closest to **P** ? (Identify which distance formula you use.)
- (C) (10 pts.) Which two rankings among **Q**, **R** and **S** are in most disagreement?