DEPARTMENT OF MATHEMATICS

MATHS 190 Tutorial 7

Discuss the following situations with one or two other students and try to work out together a solution to each question. Make sure everyone in the group contributes to the discussion. When you have an answer to a question that everyone agrees with, make some notes outlining how you worked out the answer. Then try to explain your answer to your tutor.

1. (Mindscapes 1 and 2, §4.5 of text) What makes a polygon a *regular* polygon? What makes a solid a *regular* or *Platonic* solid?

2. Use the pieces of cardboard provided to make your own models of the Platonic solids. It is not necessary for each person to make all the solids, but try to make one of each solid for each tutorial group.

3. In class, we filled out the following table:

Solid	Faces	Faces per Vertex	Edges per Face	Vertices	Edges
Tetrahedron	4				
Cube	6				
Octahedron	8				
Dodecahedron	12				
Icosahedron	20				

   The number of faces of each solid (as shown in the table) can be deduced from the name of each solid. By looking at the models you made in question 2, fill in the column listing the number of faces that meet at each vertex and also the column that lists the number of edges on each face.

   Then calculate from the information in the first three columns of the table (i.e., without direct counting) the number of vertices and edges for each solid. Compare your answers with what you get by counting the vertices and edges. Which way is quicker?

4. **Write up your answer to this question and hand it in with your answers to Assignment 3 (due Sept 30th).** Don't forget to write down the names of the people in your tutorial group, so that you can acknowledge your collaborators in your report.

   (Mindscape 14, §4.5 of text) For each regular solid, imagine slicing a small piece off at each vertex. What shape is the boundary of the cut?

5. (Mindscape 21, §4.5 of text) For each of the regular solids, imagine slicing a small piece off all the vertices to produce a new solid that has two different types of faces. Fill in the chart by counting or computing the number of vertices, edges and faces each solid now has.

Solid (pretruncation)	Number of Vertices in truncated solid	Number of Edges in truncated solid	Number of Faces in truncated solid
Tetrahedron			
Cube			
Octahedron			
Dodecahedron			
Icosahedron			

Say how many faces of each type the truncated solid has.