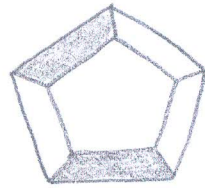


TW 314 (Applied Discrete Mathematics)

Tutorial 3: 16 February 2017

1. Let the group G of symmetries of the regular pentagon act on the set X of all possible colouring of the sides of the pentagon in two colours, before any transformations are allowed.



$x \in X$

- (a) Determine the number of orbits.
- (b) For $x \in X$ illustrated, determine $|Gx|$ and $|G_x|$.
2. Show that there are just five different necklaces which can be constructed from five white beads and three black beads. Sketch them.
3. Suppose identity cards are manufactured from square cards ruled with a 4×4 grid, with two holes punched. How many different cards can be produced in this way?
4. Find the number of ways in which the faces of a cube can be coloured in six different colours.

5. Find the number of ways in which the faces of a regular tetrahedron can be coloured in three colours if colours may be repeated.

6. Find the number of ways in which the sides of the regular tetrahedron can be coloured in three colours if colours may be repeated.