

**MATH 261 Discrete Mathematics  
Graduation Exam (November 2014)**

1. Show that in the decimal expansion of a rational number i.e. a quotient of two integers, some block of digits repeats.
  
2. Determine, up to isomorphism, the number of
  - (a) trees with five vertices;
  - (b) binary trees with three vertices;
  - (c) binary trees with  $n$  vertices.
  
3. Suppose there are three identical cases with two drawers. One has a gold ring in each drawer; One has a gold ring in one drawer and a silver ring in the other; One has a silver ring in each drawer.

Suppose that you randomly chose a case and randomly opened a drawer, and found a gold ring. What is the probability of finding a gold ring in the other drawer?