

054/156/102 Mathematics in Art  
Mid-Term Exam, October 17, 2002  
Room # 205, Arnes Lecture Theatre, 8:30 AM - 9:45 AM

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Maximum marks 50  
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1. A line segment AB is given below. Divide the line segment into four equal parts by using ruler and compass. Verify your construction by actually measuring the individual segments you so obtained with a scale marked ruler.



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2. Recall that two geometric figures are said to be similar if they have the *same shape* (i.e. corresponding sides are proportional), but not necessarily the same size. For example, two circles are always similar. Indicate whether the geometric figures given below are always, sometimes, or never similar:
- (a) Two isosceles triangles
  - (b) Two equilateral triangles
  - (c) Two golden triangles
  - (d) A regular pentagon and a regular hexagon
  - (e) A regular pentagon and a golden rectangle

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3. Describe all the symmetries (i.e. reflectional or rotational) of the Maple leaf design given below.

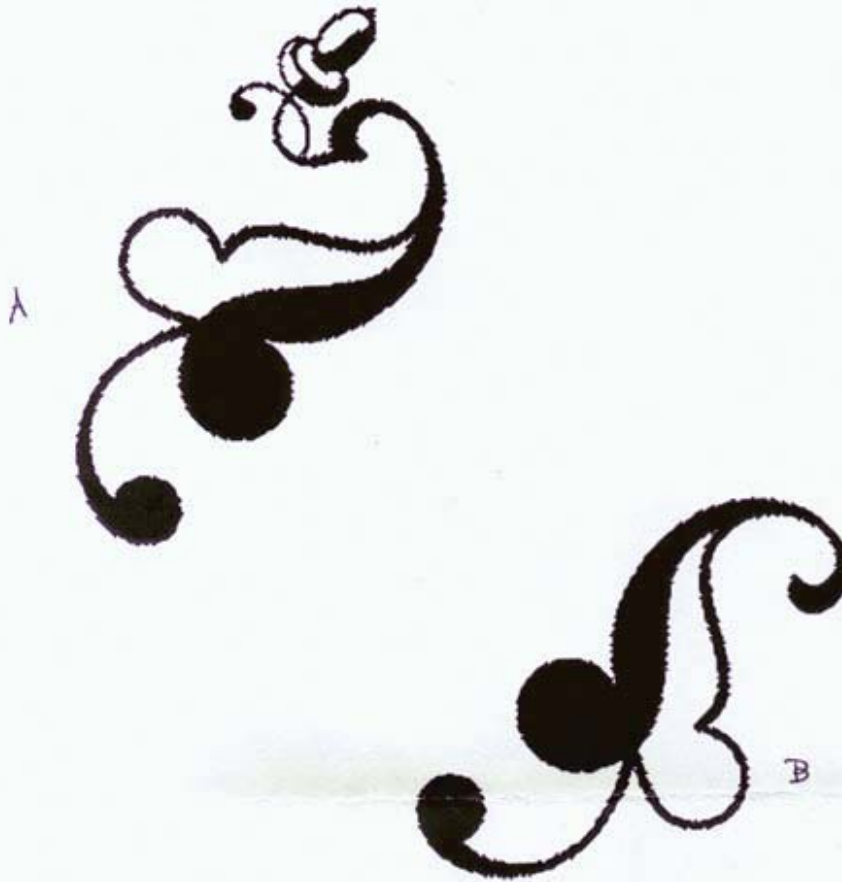


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4. Part of a circle is given below. Find the centre of the circle. What is the value of the radius? Draw the complete circle



5. The image B (given below) is obtained from the original A (on top) by reflecting A in a (mirror) line  $\lambda$ . Using this line as a mirror, draw the missing parts in the reflected image B.



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6. First three stages of a fractal tree are given in the following three diagrams. Study the iteration principle followed in the generation of these fractals and draw the shape of the next 3 stages in a separate sheet of paper.

