

054/136.102 Mathematics in Art  
Mid-Term Test, 23 October, 2001

page 1 of 5  
time 70 minutes

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NAME \_\_\_\_\_

Student ID # \_\_\_\_\_

1. Draw a line segment  $AB$  of length 12 cm and divide  $AB$  into seven equal parts by using ruler and compass. Using a marked ruler, measure the actual length of one of the seven segments you obtained. Now, using a calculator, find the value of  $12/7$  and compare.

2. Draw an 8-15-17 triangle  $\triangle ABC$  where  $AB = 8$  cm and  $BC = 15$  cm. Find the value of the angle  $\angle B$  using a protractor. State the theorem which relates the squares of the sides of this triangle and the  $\angle B$ .

5

3. Recall that two geometric figures are *similar* if they have the same shape (i.e. corresponding elements are proportional), but not necessarily the same size. Indicate whether the geometric figures described below are always, sometimes, or never similar:

- (a) Two triangles
- (b) Two isosceles triangles
- (c) Two equilateral triangles
- (d) Two golden triangles
- (e) Two pentagons

5

054/136.102 Mathematics in Art  
Mid-Term Test, 23 October, 2001

page 3 of 5  
time 70 minutes

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4. You are commissioned to construct a golden rectangle using copper wire. If the total length of the wire is 5236 feet, what is the base of the largest golden ~~triangle~~ (in integer multiple of feet) that you can construct? Draw an illustrative diagram to explain your answer. *rectangle*

10

054/136.102 Mathematics in Art  
Mid-Term Test, 23 October, 2001

page 4 of 5  
time 70 minutes

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5. Define the Fibonacci sequence. Give the first 15 numbers of the sequence. Using a calculator, compute the ratios of successive Fibonacci numbers for the first 20 numbers and make a table. Do these ratios approach a single number? If so, what is it?

10

6. Image B is obtained from the A by rotating A around a centre C and by a specific angle of  $\theta$  degrees. Find the point C and the value of the angle  $\theta$ .

12

