

## EXAM 1 - MATH 110

Friday, September 27, 2002

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Read each problem very carefully before starting to solve it. Each problem is worth 10 points. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

1. What is the smallest natural number that has three different factors?  
(Of course  $\pm 1$  are not counted as valid factors.)
2. Take a line segment of length 1. Divide it into three equal pieces and take out the middle third. Then divide the remaining two pieces into 3 equal pieces each and take out the middle thirds. Now you have 4 pieces remaining. Divide each to three pieces and take out the middle thirds. Continue in this way indefinitely.
  - (a) What would be the total length of the remaining pieces after 1, 2, 3, 4, 5 iterations of this process?
  - (b) Do you see the pattern? What would be the total length of the remaining pieces after  $n$  iterations?
  - (c) What would be the final total length of the remaining pieces if this process is repeated infinitely many times?