

Practice midterm exam for 92.322, Spring 2016 (75 minutes)

**Note:** In the actual exam, you will be given a workbook that includes space for writing down your answers and showing all your work; you will have two sides of a sheet of paper for each problem.

**Problem 1:**

- (a) Is the degree sequence 3,3,2,2,2 graphic? Explain.
- (b) Is the degree sequence 3,3,3,2,2 graphic? Explain.

**Problem 2:**

- (a) Represent the algebraic expression  $((a - b) * c) + 7) * ((d + 4) \div x)$  by a tree.
- (b) Write out the preorder traversal of the tree you found in part (a).
- (c) Write out the postorder traversal of the tree you found in part (a).
- (d) Write out the inorder traversal of the tree you found in part (a).

**Problem 3:**

A forest has three components and nine vertices. How many edges does it have? Explain. It is not enough to give an example; you must show that all examples of such a forest have the asserted number of edges.

**Problem 4:**

Use the Euclidean algorithm to compute the gcd of 221 and 187. No credit will be given even for a correct answer, unless the Euclidean algorithm is used to find it.

**Problem 5:**

Let  $\mathbb{Q}^*$  be the set of nonzero rational numbers, and define  $*$  on  $\mathbb{Q}^*$  by  $a * b = ab/2$ . Is  $[\mathbb{Q}^*, *]$  a group? Explain.