

**T-106.5400**  
**Midterm Exam**  
**February 19th, 2014**

Examiner: Travis Gagie

No written material is allowed in this exam. Submit at least one answer sheet, even if an empty one! Write on each answer sheet you submit the code of the course, the date, your name, and your student ID number. This exam has ten questions.

1. Give the border array  $B[0..12]$  for  $P = \text{ABAABABAABAAB}$ . Explain how you use  $B[0..10]$  to compute  $B[11]$ .
2. Draw the Knuth-Morris-Pratt automaton for  $\text{ABAABABAABAAB}$ .
3. Describe how the Boyer-Moore algorithm finds the occurrences of  $P = \text{BAAB}$  in  $T = \text{ABAABABAABAAB}$  using the following two-dimensional shift table:

$P =$	0	1	2	3
B	A	A	B	
A	3	0	0	1
B	3*	3	3	0

\* Report match.

4. What is the Karp-Rabin hash of  $\text{ABAABABAABAAB}$  if the alphabet is  $\{0, 1\}$ , we assign A value 0 and B value 1 and our prime number is 101?
5. If we are searching for  $\text{ABAABABAABAAB}$  with Shift-AND, what is the precomputed word for B?
6. Of the candidates 0–12, which are consistent with 6 when searching for  $\text{BAAB}$  with the Elimination Method?
7. Explain or refute the claim “BNDM is something like a mix of Boyer-Moore and Shift-AND”.