

Program in Applied Mathematics  
PROBABILITY AND STATISTICS PRELIMINARY EXAMINATION  
January 2010

Notice: Do four of the following five problems. Place an X on the line opposite the number of the problem that you are **NOT** submitting for grading. Please do not write your name anywhere on this exam. You will be identified only by your student number, given below and on each page submitted for grading. Show all relevant work.

- 1. \_\_\_\_\_
- 2. \_\_\_\_\_
- 3. \_\_\_\_\_
- 4. \_\_\_\_\_
- 5. \_\_\_\_\_
- Total \_\_\_\_\_

- (c) Find the UMVUE (uniformly minimum variance unbiased estimator) of  $(\theta)$ .
- (d) Find the MLE (maximum likelihood estimator) of  $(\theta)$ .

4. Let  $X_1; X_2; \dots; X_n$  be a random sample from the uniform distribution on the interval  $(\theta; \theta + 1)$ . Suppose that we wish to test the hypothesis  $H_0: \theta = 0$  versus  $H_1: \theta > 0$  using the test