Graduate Applications Evaluation

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Fall 2026 Cycle

I appreciate your interest in our research group at York University. We are currently considering applications from students with a strong background in theoretical computer science for both Ph.D. and M.Sc. positions, with a start date in Fall 2026 or later. To join our lab, please follow the steps outlined below.

Application Steps

1. **Understand the Questions:** Carefully read and understand the questions provided below. Providing thoughtful solutions to these questions will improve your chances of a successful evaluation.

2. **Prepare Your Answers:** Write your answers independently without consulting others. Your answers must be typeset in LaTeX and compiled into a PDF document. Use the LaTeX template available at
`https://www.eecs.yorku.ca/~kamalis/graduate_applications.tex`
(replace the author name with your own).

3. **Partial Answers:** If you find the questions challenging, you are welcome to submit partial solutions or an answer to just one question.

4. **Submit Your Application:** Use this form to upload your answers, along with your CV, transcripts, and list of published papers (if applicable): `https://forms.gle/whTf3nxz1U17VqrB7`
Please make sure to send the form even if you have communicated with Shahin in a previous email.

5. **Evaluation Criteria:** Applications are evaluated based on:

   - The quality of your submitted solutions.
   - Your GPA and academic history.
   - The institutions you have attended or are attending.
   - Your research experience, which is especially crucial for Ph.D. applicants.

   Note: **Submitting correct answers does not guarantee a successful evaluation**. If selected as a top candidate, you will be contacted for a brief interview.

6. **Post-Evaluation Process:** If your application is successful, you will be advised to apply formally. While Shahin will support your application, note that a separate admissions committee at York University will make the final decision. **Support from Shahin does not guarantee admission.**

Questions:

Consider a long straight road connecting the two cities of *El Dorado* and *Kitezh*. Along this road lie n villages (with n being an odd number). Each village will benefit from a public library we want to build somewhere on this road. The location of any point on the road is measured by its distance from El Dorado.

Our task is to decide where to build the library.

(a) First assume we hire a *reliable surveyor* who travels along the road and records the exact distances of each of the n villages from El Dorado. Let these distances be $d_1, d_2, \ldots, d_n$, where each d_i represents the distance of the i-th village from El Dorado. We assume the villages are listed in order along the road, so $d_1 < d_2 < \cdots < d_n$. Our objective is to choose a location that *minimizes the total sum* of distances from all villages to the library. What location should be chosen? Briefly justify your answer.
Answer: Write your answer here.

(b) Now suppose we *do not* hire the surveyor. Instead, each village *reports its own* location, and we must base our decision only on these reports. A village might benefit from reporting a location that differs from its true one if this causes the library to move closer to it. We call a decision rule *reliable* if no village can gain by reporting a false location. Is the method from part (a) reliable? Explain briefly.
Answer: Write your answer here.

(c) Consider a different objective: instead of minimizing the total distance, we now wish to *minimize the maximum distance* from any village to the library. Assuming the true locations $d_1, \ldots, d_n$ are known (as before $d_i < d_{i+1}$), which location achieves this objective? Justify your answer.
Answer: Write your answer here.

(d) In the situation of part (c), suppose again that villages report their own locations (with the possibility of misreporting). Is the placement method described in (c) *reliable*? Explain briefly.
Answer: Write your answer here.

(e) If your answer in (d) is negative, propose an *alternative decision rule* that *is* reliable, even if it does not necessarily achieve the smallest possible maximum distance. Your rule should specify how the location is determined and why no village would benefit from reporting a false location.
Answer: Write your answer here.