Please review the assignment document description (including the rubric) and the following resources prior to completing this assignment:

22 Key Competencies & Indicators for CBA Applications
https://www.apega.ca/apply/membership/professional-member/work-experience/engineers/competency-based-assessment-tool/competencies-and-indicators

CBA Guide
https://www.apega.ca/docs/default-source/pdfs/cba-user-guide.pdf?sfvrsn=946adc4b_9
   *Pay particular attention to page 15 of this document where it gives tips for successfully completing the CBA (which is also how we will be grading)

Note on confidentiality of responses
These assignments will only be reviewed by the instructor and teaching assistants and all information will be kept confidential. If you are using industry-based examples, I recommend choosing ones that you are open to share.

Student Name: Gerardo Garcia de Leon

Key Competency: 1.4 Application of Theory (technical competency)

SITUATION

> Max 400 characters.
>
> During my engineering design course, I participated in the design process for the automation of an irrigation system, including the creation of a planter box to hold the plant being irrigated. I oversaw designing the structure of the box to ensure maximum coverage by the irrigation system while also ensuring it could correctly hold the weight of the soil inside.

ACTION

> Max 1800 characters.
>
> The irrigation system needed to be constructed from very simple materials including vinyl tubing and a battery-powered motor what would suction the water up the tube from the holding container. Using Bernoulli's equation combined with the Hagen-Poiseuille equation for pressures and flow in a tube, I calculated the required values for the motor to correctly pump the water up to the height of the irrigation system.
>
> During the design process of the planter box, it was imperative to calculate the coverage of the irrigation system I had created to be able to begin the design process for the container which would hold the plant. Using knowledge from calculus and physics backgrounds, I used formulas for circular area coverage and projectile motion to calculate the rough shape in which the water would drain onto the soil to visualize the shape which would be covered by the water from the irrigation system to ensure no spot was left dry.
>
> Continuing this process, once the maximum coverage was obtained, the design of the box needed to be created. By using the knowledge from static forces and their behavior, I was able to calculate the maximum static friction the adhesives which hold the box together would be able to handle based on the materials we were using to verify that it would not collapse on itself or tear apart once the soil was added. With this knowledge I reverse engineered a fitting shape for the box to efficiently combine all different aspects of this process to finalize the planter box.

OUTCOME

> Max 400 characters.
>
> The final product was a highly optimized planter box which could hold the weight of five pounds of soil and had an efficient irrigation system which maximized the amount of water received. This product won in a competition against other planter boxes as it combined many aspects together to create a harmonious product

Applicant's Self-Assessed Competency Level (0 to 5):

5

Key Competency: 2.1 Oral Communication in English_____ (non-technical competency)

SITUATION

Max 400 characters.

I had to create a solution for an unnamed city during a competition to optimize the placement of their fire stations to maximize coverage and ensure optimal response times with 100% coverage of the city. The solution needed to be presented to shareholders of an unnamed company and regular citizens to promote the viability of my solution.

ACTION

Max 1800 characters.

I began by creating the solution to the problem using Erich Friedman's optimized solutions for circles covering squares and modified the theory to fit the shape of the city I was given. Once the solution was created, I began working on the presentation for the shareholders.

I explained the solution and the theory behind it supporting my claims with the research of Erich Friedman and other mathematicians. My presentation consisted of a PowerPoint slideshow with visual representations of my findings to facilitate my explanations and aid in visualizing the results. The shareholders then asked questions of how I came up with my solution and gave insights on how they believed the solution could be improved. I responded by thoroughly explaining my process and how I would implement the changes they suggested in a later revision of the solution.

During the presentation to the public crowd, it was less formal and intended to better inform the people of the importance of fire stations being strategically placed in the areas to increase the safety of their communities. I presented them the same version of the PowerPoint, explaining the basis of the findings and using my visual aids to help their understanding. The crowd inquired about the viability of such a plan for to be put in place in future years and I explained how it would be simple as the concept would not require many changes in the city as these findings have been used to begin the process of planning and construction for the long term in their city.

OUTCOME

Max 400 characters.

The result was a successful presentation which was given 5th place in the competition and was congratulated personally by the judges for the professionalism and confidence in technical knowledge of how to handle the task at hand

Applicant's Self-Assessed Competency Level (0 to 5):   4

Reflection Questions

*Respond to the following reflection questions. Aim to **write 4-5 sentences** for each question.*

1. Looking across the 22 competencies, are there any that you think will be difficult to accomplish in your first few years working in a career? Why? How can you seek out opportunities to achieve it?

   The project management principles seems like it would be a difficult task to achieve in the first few years. This would be difficult as I believe project management roles are reserved for people with more years of experience and would be difficult to obtain within the first few years of beginning my career as an engineer. I believe seeking out opportunities with high leadership or lead involvement would help as this would provide me with qualities that would be valuable in these project management roles to complete the APEGA competency.

2. Do you think APEGA's competencies assessment is a good way to regulate engineering licensure? Why or why not? How does the competency assessment support licensed engineers in adhering to the APEGA Code of Ethics?

   Yes. I believe this would allow a respectable coverage of the capabilities of a worker who is applying to become a P.Eng as these would be important experiences to verify before licensing someone. The assessment also supports engineers adhere to the code of conduct as these experiences follow a structure to act along the code of ethics which would ensure that a worker is indeed acting in an ethical manner, considering the 5 rules of APEGA.

3. What are your career goals after completing your degree? Do you plan to get your P.Eng. and do you hope to work in your engineering field of study? If so, what kind of job do you see yourself pursuing? If not, what other opportunities are you considering?

My career goals after my degree are to begin working in my field of software engineering in a company that designs new technology and enhances machine learning. I would begin working towards my P.Eng if I remained in Alberta but would potentially move abroad to seek better opportunities if they presented themselves. I see myself pursuing a job which trains artificial intelligence for a variety of purposes, but mainly every day public use. An alternative opportunity is to seek a job which focuses on prosthesis development for people who have lost limbs and would like to regain their lost limb to enhance their lives.

4. What is are biggest learnings from this course in terms of what it means to be a professional and ethical engineer? Now at the end of this course, how would you define ethics in engineering? Feel free to review your reflections from throughout the term to support your answer and reflect on your journey as a learner.

My biggest learnings include the in depth understanding of the APEGA competencies and the importance of following ethics in the engineering world as the consequences of not doing so can be catastrophic. Being a professional and ethical engineer means to be an engineer who takes pride in their work ensuring that they deliver nothing short of the best version of their work in anything they do. Engineering ethics to me now means to act in a way that you have taken every step necessary for ensuring the consideration of every important aspect to a project aside from its completion. This includes the safety of the public, the integrity and honesty of their work and knowledge, their understanding of local laws/regulations and finally their personal competency of the task at hand.