Answer the following questions:

Questions for the Classroom Activity

1. (**POGIL**) A ***password scheme*** consists of a minimum password length and the different types of symbols (i.e., letters, numbers, specials) that can be used in the password. Using the Password Strength Calculator, determine the ***optimal scheme*** for withstanding a brute force attack of at least 10 years by an ordinary PC performing 100 million tests per second.

**Answer**

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| The optimal scheme for a password is to have, Uppercase Letters, Lowercase letters, Numbers, and Special characters at a password length of 9 characters. This provides around 219.6 years of safety by a brute force program. |

2. (**POGIL**) According to [this 2012 article](http://arstechnica.com/security/2012/12/25-gpu-cluster-cracks-every-standard-windows-password-in-6-hours/), a password-cracking computer can try 350 billion passwords per second. How would you have to modify your scheme to withstand a 10-year attack by this specially designed computer?

**Answer**

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| To withstand an attack of 10 plus years would be to have a password with a length 12 characters. In this password, you would have to have numbers and uppercase and lowercase letters. |

3. (**POGIL**) That article was written in 2012. Password cracking technology has probably gotten a lot better. Suppose the number of passwords that can be checked per second doubles every year, use the Password Strength Calculator to determine an optimal password scheme for the year 2020?

**Answer**

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| To withstand a brute force attack of 10 years from a modern computer running at 44800000000000 guesses per second. You need a password with a length of 12 and including, numbers, uppercase, and lower case letters, and special characters. This will allow your password to withstand 433.7 years of brute force from a modern computer. |

4. (**POGIL**) For the routes starting and ending at Trinity College, identify the nearest neighbor route and the optimal route. What does this show you about the nearest neighbor heuristic?

**Answer**

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| **Missing 4/5** |