1. Find a hash function that will be able to hash UNL students into a hash table of no more than $N$ buckets, where $N$ is the number of students at UNL. You may use their names, NUID, or other attributes as the key, $X$, or a combination of those attributes as the key, $X$. Describe your hash function clearly. Basically, that means: $0 \leq h(X) \leq N$. Keep in mind of the two main objectives of choosing a good hash function.

   The key takes the first and third letter of your first and sum them together. Then add the last 2 digits of your student ID.

   If you are an undergrad, the entire code starts with a 0, if a graduate student, start with a 1.

   $\begin{array}{cccc}
   O & A & A & O \\
   1 & 1 & 1 & 9 \\
   \end{array}$

   $= 10400$ possibilities

   This is good, not enough. Needs about 10,000 more.

2. Apply your hash function to each member of your group. Show the computation of the function and the mapped hash value of each member. Are there collisions? If yes, how do you resolve the collisions?

   ØJH92 = John
   Ø5E28 = Steve
   ØJNø0 = Jon L.
   ØOCep = Oscar

   but these have to be #5.
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- Divide last 5 digits of NUID by 4
- Add first 3 digits to result

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1S699 - Mike
141041 - Sarah
150841 - Ross
8690 - Justin
18581 - Eric
8269 - Michael
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Take the last # of your NUID and the first letter of your first name, then take the first letter where it is in the alphabet and add.

0 possible choices = 26 possible choices

2. Apply your hash function to each member of your group. Show the computation of the function and the mapped hash value of each member. Are there collisions? If yes, how do you resolve the collisions?

$h(\text{Robert}, 0) \rightarrow 18 + 0 = 18$
$h(\text{Sam}, 6) \rightarrow 19 + 6 = 25$
$h(\text{Mike}, 8) \rightarrow 13 + 8 = 21$
$h(\text{Kay}, 8) \rightarrow 16 + 8 = 24$

No collisions! We are just that good.

Too many collisions
Not a good hash function
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   Sum the ASCII representation of the letters in the first & last name (up to 15 characters each)

   15 characters
   
   Let's say, each ASCII ranges from 0-127.
   
   \( 15 \times 127 = 1805 \) choices/buckets.

   Not enough for 20,000+ UNL students.

   Too many collisions.

2. Apply your hash function to each member of your group. Show the computation of the function and the mapped hash value of each member. Are there collisions? If yes, how do you resolve the collisions?
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   Add last 2 letters of the first name and first two letters of the last name.

   $26 + 26 + 26 + 26 \equiv 120 \text{ by different values} \Rightarrow 120 \text{ buckets}$

   Not enough for 20,000+ UNL students, too many collisions.

2. Apply your hash function to each member of your group. Show the computation of the function and the mapped hash value of each member. Are there collisions? If yes, how do you resolve the collisions?

   Name      | Function | Hash Value
   ----------|----------|------------
   John      | $4t + 13 + 1$ | 28         
   Maria     | $20 + 15 + 10$ | 46         
   Alex      | $6 + 11 + 1$ | 29         
   Zara      | $1 + 19 + 1 + 5$ | 38         

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\begin{align*}
\text{Get the ASCII number for the first Initial, middle initial and last initial.} \\
\text{Multiply 3 numbers.} \\
\text{largest: } 26 \times 26 \times 26 = 17,576. \\
\text{unordered: } 26, 057.
\end{align*}

2. Apply your hash function to each member of your group. Show the computation of the function and the mapped hash value of each member. Are there collisions? If yes, how do you resolve the collisions?

\begin{align*}
\text{JAK } &\rightarrow 10 \times 1 \times 11 = 110. \\
\text{CWT } &\rightarrow 3 \times 22 \times 20 = 1320. \\
\text{BBH } &\rightarrow 2 \times 2 \times 8 = 32. \\
\text{TND } &\rightarrow 20 \times 14 \times 4 = 1120. \\
\text{FKH } &\rightarrow 6 \times 11 \times 8 = 528.
\end{align*}