The purpose of these problems is to get some insight into picking the parameters p and α for DHKE

1. Let $p = 7$
   (a) Let $\alpha = 2$ and calculate $\alpha^i \mod p$ for $i = 1, 2, \ldots, 6$
   How many unique values do you get?

   Remember the *Mathematica* command `Table[ Mod[2^i,7], {i,1,6}]`

   (b) Repeat (a) for $\alpha = 3$

   (c) Based on your answers, using $p = 7$, would you choose $\alpha = 2$ or $\alpha = 3$ for DHKE? Explain.

2. Let $p = 31$ and repeat #1 with $i = 1, \ldots, 30$ for $\alpha = 2$ and $\alpha = 3$

3. Let $p = 167$. Which would you pick: $\alpha = 166$ or $\alpha = 2$? Why?

3. What are the elements of $\mathbb{Z}_{12}^*$? of $\mathbb{Z}_{11}^*$?

4. What is ord(2) in $\mathbb{Z}_{31}^*$? ord(3) in $\mathbb{Z}_{31}^*$? ord(7) in $\mathbb{Z}_{31}^*$?

5. Is 2 a generator in $\mathbb{Z}_{31}^*$? How about 3? How about 7?

6. What connection do you see to DHKE?