Block 1 Non-Major Pizza Problem (no 200+ coursework)

Find the next number in this sequence, and explain how you got that number: 1, 8, 81, 1024, 15625, ?

Email your solution to awagner@coloradocollege.edu. The most complete solution wins a pizza at the end of the block! If your solution is just as complete as another, the first of those to be submitted takes priority, so both speed and thoroughness are important. Good luck!
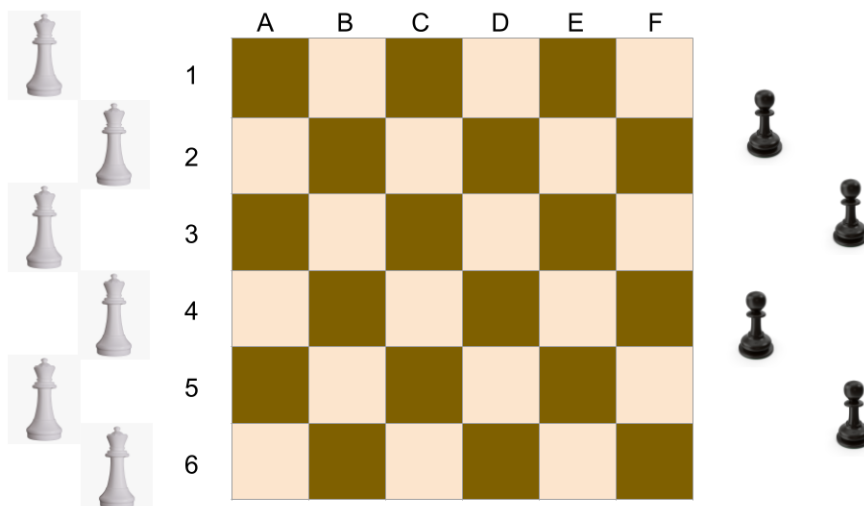
Block 1 Math Pizza Problem (open to all)

Imagine a 6x6 chessboard (smaller than a normal chessboard). Find positions for 6 queens such that at least 4 pawns are safe. In other words, can you place 6 queens on the chessboard and still leave 4 or more spaces that none of the queens can attack?

You can submit a drawing, or simply list positions for the queens. For example, if you positioned all your queens on the top row, you would submit this list: A1, B1, C1, D1, E1, F1.

Email your solution to awagner@coloradocollege.edu. The most complete solution wins a pizza at the end of the block! If your solution is just as complete as another, the first of those to be submitted takes priority, so both speed and thoroughness are important. Good luck!

(Four was the most safe spots Alex could find, but if you find even more, your answer will be considered more complete! If you can prove that there is no way to have more safe pawns than you got, that will improve the completeness of your answer as well.)

Block 1 Computer Science Pizza Problem (open to all)

VRDMVDVHUEYJBMPTFAEAUPSKPIVPKNVGBLOAKJBADKKYQWXWJUZADZVJFZCGEQIWQSMYZWELYCTXERQFFJELJBBTVJ
VGBQXMEHBUOVSYDIEKVNIMSJEUNMSKEIUIGGIXJVDZVYOOVAJBEQMLZIOIBQNBBBIGLLFXVQZHTCBHICTMSLYIVORLKBB
BCMIYMGKDCNIMGGIEJXELZHUWDZZMBTBWRXZEYMCXZQODUGFIZAQTBQPARGUPOXZLTBYFVNPAETDCUBRAJGFACSXY
PNMGLLTMDZZMJAFSCCEAKQJNIMKXFLFUOFKCPVOVGYSAYFSOUBYSTBJMFWJODPKVVFJKSGLMNMKDPIVUEKKMVJWAK
UQZYYIUNBRSKMFXKJRNFADZZMNMCKRAFQXLFQPZNKXCWMXSEYOOVAJBEQMLZIOIBQNCUPYMKBBZNUFXJVQLYYJVNA
TYTWPLYYTXKUVMJNIGLXPVYLYUWMKLVRUNSDVIGIVDKBFMXYCCTPGGIXTASEGFZICCKBFXKJRJSWPWJMJWXSCUOLRW
NCMTQAMYZWEGEYUPOXZLTBZWIMPVDGGLPLEUVUTWVMKCPVDZRNTMZSIUUMCSKFFICLYUMNYXKBFEYJUMDWBJVW
UTIAJNIMGAEHFZ

Above is a ciphertext encrypted using the Vigenère cipher algorithm. This algorithm works as follows:

A secret key is chosen and is repeated beneath the plaintext to be the same length as the plaintext, like so:

Plaintext to encrypt: HEREISMYSECRETMESSAGE

Key: BURGE

H	E	R	E	I	S	M	Y	S	E	C	R	E	T	M	E	S	S	A	G	E
B	U	R	G	E	B	U	R	G	E	B	U	R	G	E	B	U	R	G	E	B

Each character of the key decides how far in the alphabet to shift each plaintext character. In this case, since B is the 1st letter in the (0-indexed) alphabet, the initial H in the plaintext becomes an I (shifted 1 letter) in the ciphertext. Since U, the next letter in the key, is the 20th letter, the E gets shifted 20 letters and becomes a Y. After that, the R in the key causes the plaintext R to shift 17 letters, causing it to loop around and become an I. In this example, the resulting ciphertext is:

I	Y	I	K	M	T	G	P	Y	I	D	L	V	Z	Q	F	M	J	G	K	F

Decrypting a Vigenère ciphertext given the key is pretty easy. Doing so without the key? Pizza Problem-worthy! You have two options:

1. Various observations have been made over time about how to crack this cipher, including, notably, the Kasiski Method. Your task is to implement this (or another) cryptanalysis method. You may use the internet to learn about the Vigenère cipher algorithm and the Kasiski Method, but **you may not use any Vigenère or Kasiski code from the internet or any online Vigenère cipher-solvers.** Submit the decrypted message and any code you wrote to help you find it.
2. Of course, if you want the key…come in and say hi! It should be in plain sight in the paraproffice. Same rules as above, still: **write and submit your own program** to decrypt the ciphertext.

Email your solution (including your code) to emerenstein@coloradocollege.edu–the first correct solution wins the pizza. Again, no cheating! The only place you should be pasting the ciphertext is in your own code or command line.