Name:

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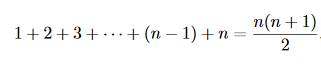
M1 Assignment S2\_03

Submit completed assignment here: https://docs.google.com/forms/d/e/1FAIpQLSdDMBHPkETEMZn0UaGjfmh-OpklthveTYtfxjKZNGwBGLbJBg/viewform

**Part 0) Complete the Following** [**https://docs.google.com/forms/d/e/1FAIpQLSevUWiv6c\_6UpoIaSUWgetpIW0GLmBaICqR8hT2JKCBJWF05w/viewform**](https://docs.google.com/forms/d/e/1FAIpQLSevUWiv6c_6UpoIaSUWgetpIW0GLmBaICqR8hT2JKCBJWF05w/viewform)

**Number Theory:** [**http://www.math.brown.edu/~jhs/frintch1ch6.pdf**](http://www.math.brown.edu/~jhs/frintch1ch6.pdf)

1. Give an example of a 1 modulo 4 number:
2. What are the first 5 terms of the Fibonacci sequence:
3. How many prime numbers are there?
4. What number shape is the integer 10?
5. What does the following formula do:



1. Who discovered the previous formula?

**Ciphers:** [**http://practicalcryptography.com/ciphers/**](http://practicalcryptography.com/ciphers/)

1. Use a Caesar Cipher with a shift equal to +29 to encrypt the following message:

Alphabet: vukimetbpyljxoqgdfscrhznaw

Message: Meet me Monday

Shift: +29

1. The following message has been encrypted with a Vigenere cipher: **rhmhepmorrvsfa** given the encryption key: **echo** and adding a space as the 27th letter in the alphabet, decrypt the message.

**Multtiplication:** [**https://www.quantamagazine.org/mathematicians-discover-the-perfect-way-to-multiply-20190411/**](https://www.quantamagazine.org/mathematicians-discover-the-perfect-way-to-multiply-20190411/)

1. If you want to know how fast computers can solve certain mathematical problems, then \_\_\_\_\_\_ pops up as some kind of basic building brick.
2. How many steps for the carrying method?
3. How long did it take for Karatsuba to find a faster multiplication method?
4. Use the Karatsuba method to multiply 25 by 63, show all of your steps: