1. The code tries to impliment a collision attack by replacing words with synonyms and attempting to find a hash collision with the original text

2.
10-12)
$x = 0$ None
$x = 1$ None
$x = 2$ None
$x = 3$ None
$x = 4$ None
$x = 4$ None
$x = 5$ $(5, 2)(5, 9)$
$x = 6$ None
$x = 7$ $(7, 2)(7, 9)$
$x = 8$ $(8, 3)(8, 8)$
$x = 9$ None
$x = 10$ $(10, 2)(10, 9)$
Thus $[(2, 4), (2, 7), (3, 5), (3, 6), (5, 2), (5, 9), (7, 2), (7, 9), (8, 3), (8, 8), (10, 2), (10, 9)]$
10-13)
There are not a whole lot of different points reducing security 10-14)
2G: (5,2) 3G: (8,3) 4G: (10,2) 5G: (3,6) 6G: (7,9) 7G: (7,2) 8G: (3,5) 9G: (10,9) 10G: (8,8) 11G: (5,9) 12G: (2,4) 13G: (2,7)
10-15)
a) public key is $P_b = 7G = (7, 2)$
b) $C_m = \{kG, P_m + kP_B\} = \{3G, P_m + 3P_B\} = \{(8, 3), (10, 9) + (3, 5)\} = \{(8, 3)(2, 4)\}$
c) $P_m = n_B * (8, 3) - (2, 4) = (3, 5) - (2, 4) = (10, 9)$

3.
31531: prime
520482: composite 2 * 260241 = 520482
485827: prime
15485863: prime