1 Given that $\lambda(p^a) = p^a - p^{a-1}$ if $p$ is odd, and that $\lambda(2^a) = 2^{a-2}$ if $a > 2$, calculate $\lambda(n)$ for each of $n = 95, 96, 97, 98, 99$.

2 Show that 2821 is a Carmichael number.

3 Apply the Miller–Rabin primality test to $n = 1729$.
   [For this question you may find it useful to do the computations in Maple, or some other computer algebra system. If you do this, then also apply the test to $n = 1753$, and show enough of your working to show that you understand how the test works.]

4 Bob’s El-Gamal public key is $p = 103$, $g = 5$, $h = 54$.
   (a) Show that 5 is a primitive root modulo 103.
   (b) Encrypt the plaintext 13 for sending to Bob.
   (c) What is Bob’s secret number?
   (d) Decrypt the ciphertext $(43, 102)$ which was sent to Bob.