

**Exercise 1.** Let  $\Lambda_2 = \Lambda \cdot \log + \Lambda * \Lambda$ . Prove that Selberg's asymptotic formula (Theorem 4.18) is equivalent to the statement

$$\sum_{n \leq x} \Lambda_2(n) = 2x \log x + O(x).$$

**Exercise 2.** Let  $g(x)$  and  $h(x)$  be continuous at  $x = 0$  with  $g(0) = h(0) = L$ . Suppose  $f(x)$  is a function with the following property: for any  $\epsilon > 0$  there exists an  $x_0$  so that  $g(\epsilon) \leq f(x) \leq h(\epsilon)$  for all  $x \geq x_0$ . Prove that  $\lim_{x \rightarrow \infty} f(x) = L$ . What choices of  $g$  and  $h$  are used in Levinson to prove the prime number theorem (see page 244)?