

Section 9.4

9.4.1 Estimating the number of primes

- a. Use the Prime Number Theorem to give an approximation for the number of prime numbers in the range 2 through 1,000. $\approx 1,000 \cdot 1/\ln(1,000) \approx 148$
- b. Use the Prime Number Theorem to give an approximation for the number of prime numbers in the range 2 through 100,000. $\approx 100,000 \cdot 1/\ln(100,000) \approx 1686$
- c. Use the Prime Number Theorem to give an approximation for the number of prime numbers in the range 2 through 10,000,000. $\approx 10,000,000 \cdot 1/\ln(10,000,000) \approx 620,421$
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9.4.2 Counting the number of prime numbers in a given range. $\pi(x)$ is defined to be the number of prime numbers in the range 2 through x (inclusive).

- a. $\pi(10) = 4 : \{2, 3, 5, 7\}$
- b. $\pi(20) = 8 : \{2, 3, 5, 7, 11, 13, 17, 19\}$
- c. $\pi(30) = 10 : \{2, 3, 5, 7, 11, 13, 17, 19, 23, 29\}$
- d. $\pi(40) = 12 : \{2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37\}$
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