

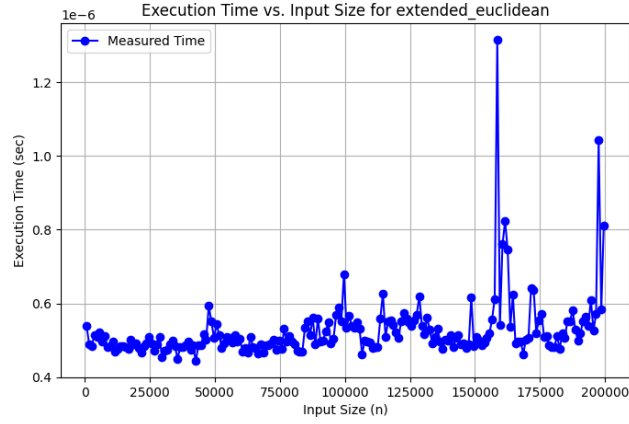
Discrete Functions Complexity Analysis Report

Complexity Analysis for `extended_euclidean`

Best Fit Complexity: Constant: time = 2.2E-05 (sec)

Detailed Fit Residuals: | Complexity Class | Residual | |-----| |-----|
| Constant: time = 2.2E-05 (sec) | 2.8E-08 | | Linear: time = 6.6E-05 +
-4.4E-10n (sec) | 2E-08 | | Quadratic: time = 4.2E-05 + -1.4E-15n² (sec) |
2.4E-08 | | Cubic: time = 3.5E-05 + -5.9E-21n³ (sec) | 2.6E-08 | | Polynomial:
time = 0.0017 x^{-0.53} (sec) | 9.3E-10 | | Logarithmic: time = 0.00028 + -2.4E-
05log(n) (sec) | 2.3E-09 | | Linearithmic: time = 6.2E-05 + -3.4E-11nlog(n)
(sec) | 2.1E-08 | | Exponential: time = 1.8E-05 1ⁿ (sec) | 2.7E-08 |

Execution Time vs. Input Size Plot:

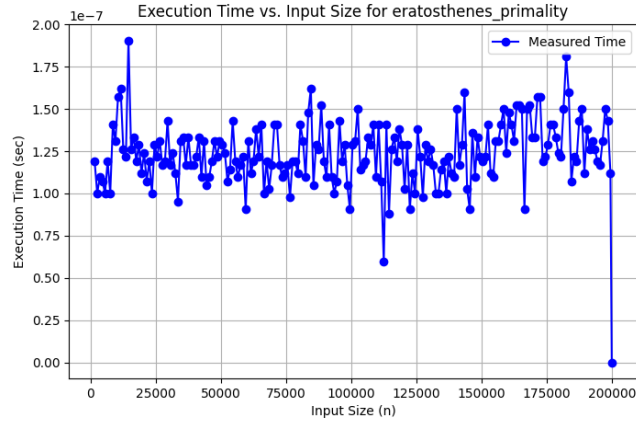


Complexity Analysis for `eratosthenes_primality`

Best Fit Complexity: Constant: time = 1E-05 (sec)

Detailed Fit Residuals: | Complexity Class | Residual | |-----| |-----|
| Constant: time = 1E-05 (sec) | 4.6E-09 | | Linear: time = 1.8E-06 +
8.3E-11n (sec) | 4.3E-09 | | Quadratic: time = 5.3E-06 + 3.5E-16n² (sec) |
4.4E-09 | | Cubic: time = 7.3E-06 + 1.3E-21n³ (sec) | 4.5E-09 | | Polynomial:
time = 2.7E-06 x^{0.031} (sec) | 5E-09 | | Logarithmic: time = -2E-05 + 2.7E-
06log(n) (sec) | 4.4E-09 | | Linearithmic: time = 2.2E-06 + 6.7E-12nlog(n)
(sec) | 4.3E-09 | | Exponential: time = 3.7E-06 1ⁿ (sec) | 5E-09 |

Execution Time vs. Input Size Plot:

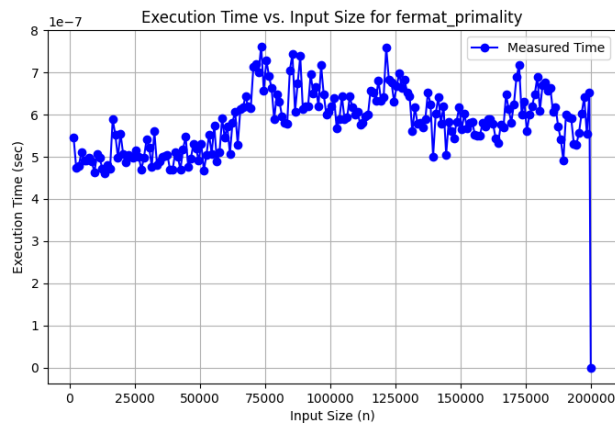


Complexity Analysis for `fermat_primality`

Best Fit Complexity: Constant: time = $3.4E-05$ (sec)

Detailed Fit Residuals: | Complexity Class | Residual | |
 ———| | Constant: time = $3.4E-05$ (sec) | $3E-10$ | | Linear: time = $3.6E-05 + -1.3E-11n$ (sec) | $2.9E-10$ | | Quadratic: time = $3.5E-05 + -7.2E-17n^2$ (sec) | $2.9E-10$ | | Cubic: time = $3.5E-05 + -4.2E-22n^3$ (sec) | $2.9E-10$ | | Polynomial: time = $4E-05 x^{-0.015}$ (sec) | $3E-10$ | | Logarithmic: time = $3.9E-05 + -4.5E-07\log(n)$ (sec) | $2.9E-10$ | | Linearithmic: time = $3.6E-05 + -1.1E-12n\log(n)$ (sec) | $2.9E-10$ | | Exponential: time = $3.5E-05 1^n$ (sec) | $2.9E-10$ |

Execution Time vs. Input Size Plot:

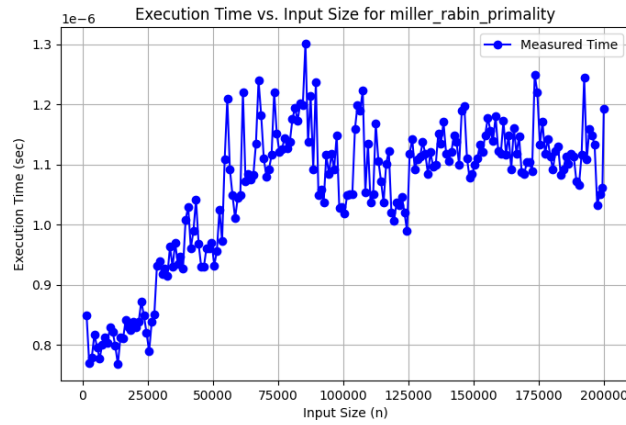


Complexity Analysis for miller_rabin_primality

Best Fit Complexity: Constant: time = 7E-05 (sec)

Detailed Fit Residuals: | Complexity Class | Residual | |
 |-----| | Constant: time = 7E-05 (sec) | 1.1E-08 | | Linear: time = 6.5E-05 + 5.6E-11n (sec) | 1E-08 | | Quadratic: time = 6.9E-05 + 8.8E-17n² (sec) | 1.1E-08 | | Cubic: time = 7.1E-05 + -3E-22n³ (sec) | 1.1E-08 | | Polynomial: time = 4E-05 x^{0.044} (sec) | 1E-08 | | Logarithmic: time = 2.3E-05 + 4.3E-06log(n) (sec) | 1E-08 | | Linearithmic: time = 6.5E-05 + 4.3E-12nlog(n) (sec) | 1E-08 | | Exponential: time = 6.4E-05 1ⁿ (sec) | 1.1E-08 |

Execution Time vs. Input Size Plot:

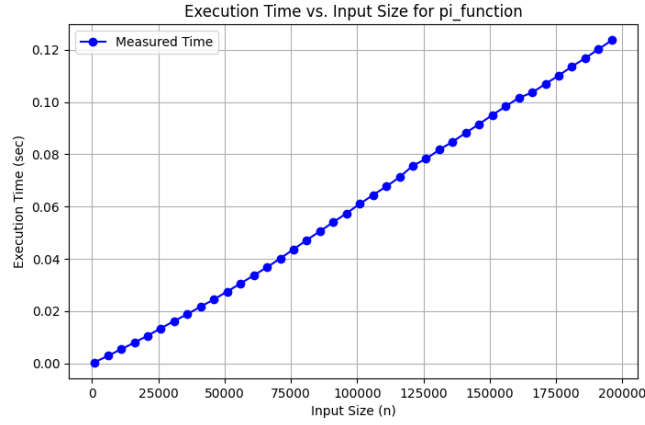


Complexity Analysis for pi_function

Best Fit Complexity: Linearithmic: time = -0.007 + 5.3E-07*n*log(n) (sec)

Detailed Fit Residuals: | Complexity Class | Residual | |
 |-----| | Constant: time = 0.62 (sec) | 1.7 | | Linear: time = -0.037 + 6.5E-06n (sec) | 0.003 | | Quadratic: time = 0.19 + 3E-11n² (sec) | 0.094 | | Cubic: time = 0.29 + 1.5E-16n³ (sec) | 0.26 | | Polynomial: time = 2.6E-06 x^{1.1} (sec) | 0.0027 | | Logarithmic: time = -1.8 + 0.22log(n) (sec) | 0.62 | | Linearithmic: time = -0.007 + 5.3E-07nlog(n) (sec) | 0.00053 | | Exponential: time = 0.041 1ⁿ (sec) | 2.6 |

Execution Time vs. Input Size Plot:

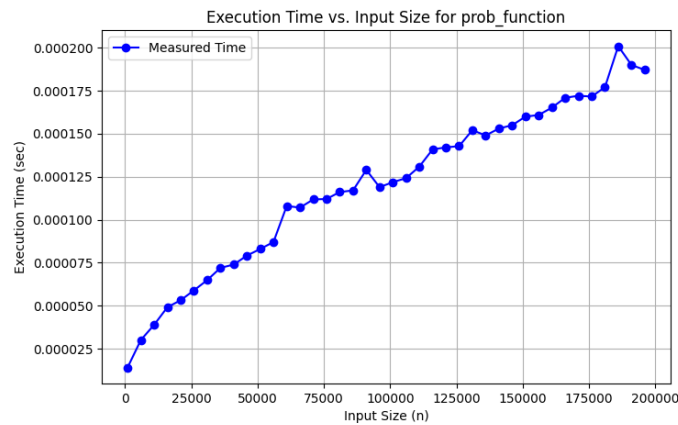


Complexity Analysis for prob_function

Best Fit Complexity: Linear: $\text{time} = 0.00033 + 8.4\text{E-}09 \cdot n$ (sec)

Detailed Fit Residuals: | Complexity Class | Residual | |
 —|| Constant: $\text{time} = 0.0012$ (sec) | $2.9\text{E-}06$ | | Linear: $\text{time} = 0.00033 + 8.4\text{E-}09n$ (sec) | $9.7\text{E-}08$ | | Quadratic: $\text{time} = 0.00065 + 3.7\text{E-}14n^2$ (sec) | $5.3\text{E-}07$ | | Cubic: $\text{time} = 0.00079 + 1.7\text{E-}19n^3$ (sec) | $8.9\text{E-}07$ | | Polynomial: $\text{time} = 3\text{E-}06 \cdot x^{0.53}$ (sec) | $2.8\text{E-}08$ | | Logarithmic: $\text{time} = -0.0024 + 0.00033\log(n)$ (sec) | $5.4\text{E-}07$ | | Linearithmic: $\text{time} = 0.00038 + 6.7\text{E-}10n\log(n)$ (sec) | $1.3\text{E-}07$ | | Exponential: $\text{time} = 0.00033 \cdot 1^n$ (sec) | $1.2\text{E-}06$ |

Execution Time vs. Input Size Plot:

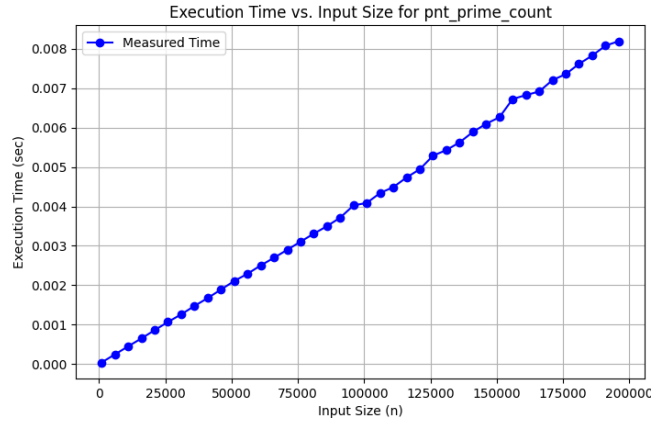


Complexity Analysis for pnt_prime_count

Best Fit Complexity: Linear: $\text{time} = 0.0011 + 4.1\text{E-}07 \cdot n$ (sec)

Detailed Fit Residuals: | Complexity Class | Residual | |
 | Constant: $\text{time} = 0.042$ (sec) | 0.0067 | | Linear: $\text{time} = 0.0011 + 4.1\text{E-}07n$ (sec) | $9\text{E-}06$ | | Quadratic: $\text{time} = 0.016 + 1.9\text{E-}12n^2$ (sec) | 0.00052 | | Cubic: $\text{time} = 0.022 + 9\text{E-}18n^3$ (sec) | 0.0012 | | Polynomial: $\text{time} = 4.1\text{E-}07 x^1$ (sec) | $2.1\text{E-}05$ | | Logarithmic: $\text{time} = -0.11 + 0.014\log(n)$ (sec) | 0.0021 | | Linearithmic: $\text{time} = 0.003 + 3.3\text{E-}08n\log(n)$ (sec) | $2.2\text{E-}05$ | | Exponential: $\text{time} = 0.0037 \cdot 1^n$ (sec) | 0.0094 |

Execution Time vs. Input Size Plot:

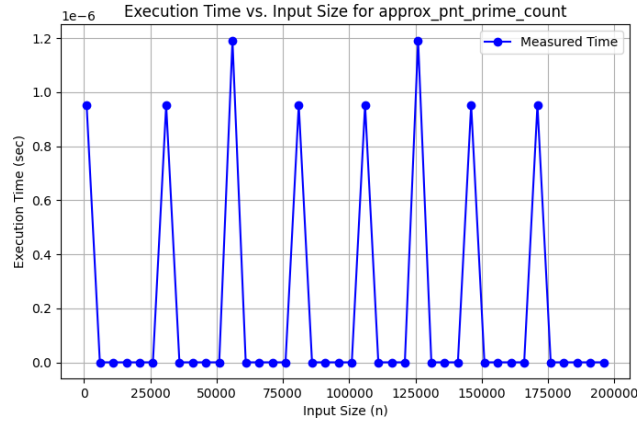


Complexity Analysis for approx_pnt_prime_count

Best Fit Complexity: Constant: $\text{time} = 1.5\text{E-}06$ (sec)

Detailed Fit Residuals: | Complexity Class | Residual | |
 | Constant: $\text{time} = 1.5\text{E-}06$ (sec) | $8\text{E-}12$ | | Linear: $\text{time} = 2.4\text{E-}06 + -8.5\text{E-}12n$ (sec) | $5.1\text{E-}12$ | | Quadratic: $\text{time} = 1.9\text{E-}06 + -3\text{E-}17n^2$ (sec) | $6.5\text{E-}12$ | | Cubic: $\text{time} = 1.8\text{E-}06 + -1.3\text{E-}22n^3$ (sec) | $6.9\text{E-}12$ | | Polynomial: $\text{time} = 2\text{E-}05 x^{-0.25}$ (sec) | $4.1\text{E-}13$ | | Logarithmic: $\text{time} = 7.7\text{E-}06 + -5.6\text{E-}07\log(n)$ (sec) | $9.2\text{E-}13$ | | Linearithmic: $\text{time} = 2.3\text{E-}06 + -6.6\text{E-}13n\log(n)$ (sec) | $5.3\text{E-}12$ | | Exponential: $\text{time} = 2\text{E-}06 \cdot 1^n$ (sec) | $5.2\text{E-}12$ |

Execution Time vs. Input Size Plot:

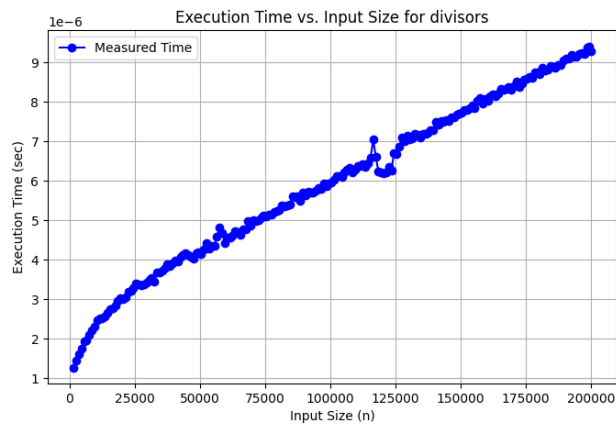


Complexity Analysis for divisors

Best Fit Complexity: Constant: time = $5.3E-05$ (sec)

Detailed Fit Residuals: | Complexity Class | Residual | |
 |-----| | Constant: time = $5.3E-05$ (sec) | $4.5E-09$ | | Linear: time = $2E-05 + 3.3E-10n$ (sec) | $1E-10$ | | Quadratic: time = $3.2E-05 + 1.5E-15n^2$ (sec) | $5.2E-10$ | | Cubic: time = $3.7E-05 + 7.2E-21n^3$ (sec) | $9.5E-10$ | | Polynomial: time = $1.6E-06 x^{0.31}$ (sec) | $6.2E-10$ | | Logarithmic: time = $-7.9E-05 + 1.2E-05 \log(n)$ (sec) | $1.2E-09$ | | Linearithmic: time = $2.2E-05 + 2.7E-11 \ln \log(n)$ (sec) | $1.2E-10$ | | Exponential: time = $2.3E-05 1^n$ (sec) | $4.6E-10$ |

Execution Time vs. Input Size Plot:

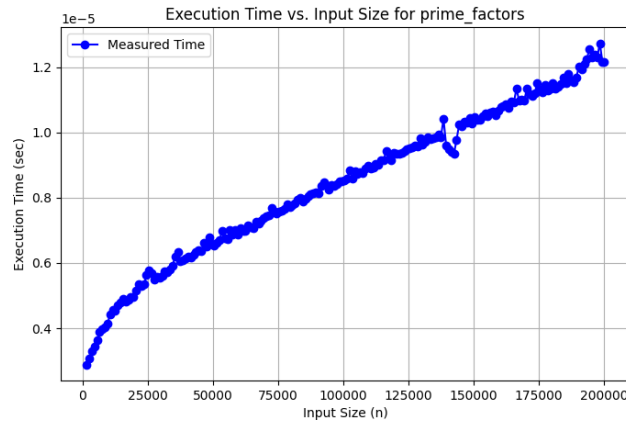


Complexity Analysis for prime_factors

Best Fit Complexity: Constant: time = 7.3E-05 (sec)

Detailed Fit Residuals: | Complexity Class | Residual | |
 | Constant: time = 7.3E-05 (sec) | 8.9E-09 | | Linear: time = 2.6E-05 + 4.6E-10n (sec) | 2.4E-10 | | Quadratic: time = 4.2E-05 + 2.1E-15n² (sec) | 9.7E-10 | | Cubic: time = 5E-05 + 1E-20n³ (sec) | 2E-09 | | Polynomial: time = 3.1E-06 x^{0.28} (sec) | 2.1E-09 | | Logarithmic: time = -0.0001 + 1.6E-05log(n) (sec) | 3.2E-09 | | Linearithmic: time = 2.8E-05 + 3.8E-11nlog(n) (sec) | 2.5E-10 | | Exponential: time = 3.2E-05 1ⁿ (sec) | 8.3E-10 |

Execution Time vs. Input Size Plot:



Complexity Analysis for factorize

Best Fit Complexity: Constant: time = 7.7E-05 (sec)

Detailed Fit Residuals: | Complexity Class | Residual | |
 | Constant: time = 7.7E-05 (sec) | 9.4E-09 | | Linear: time = 2.9E-05 + 4.8E-10n (sec) | 2.9E-10 | | Quadratic: time = 4.6E-05 + 2.2E-15n² (sec) | 9.7E-10 | | Cubic: time = 5.4E-05 + 1E-20n³ (sec) | 2E-09 | | Polynomial: time = 4.2E-06 x^{0.26} (sec) | 2.5E-09 | | Logarithmic: time = -0.0001 + 1.6E-05log(n) (sec) | 3.6E-09 | | Linearithmic: time = 3.1E-05 + 3.9E-11nlog(n) (sec) | 2.9E-10 | | Exponential: time = 3.5E-05 1ⁿ (sec) | 7.5E-10 |

Execution Time vs. Input Size Plot:

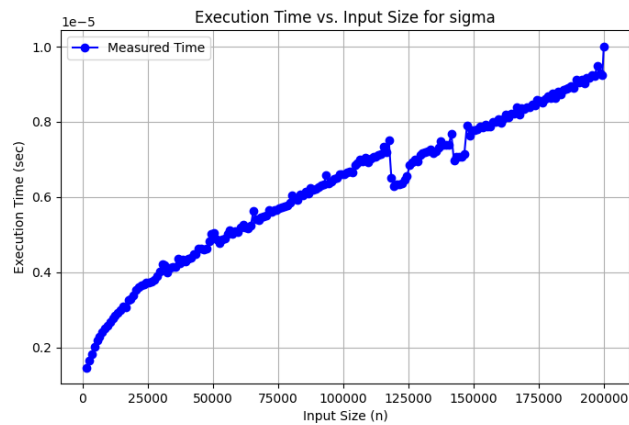


Complexity Analysis for sigma

Best Fit Complexity: Constant: time = 5.4E-05 (sec)

Detailed Fit Residuals: | Complexity Class | Residual | |
 ————| | Constant: time = 5.4E-05 (sec) | 5.6E-09 | | Linear: time = 1.7E-05 + 3.7E-10n (sec) | 1E-10 | | Quadratic: time = 3E-05 + 1.7E-15n² (sec) | 3.5E-10 | | Cubic: time = 3.6E-05 + 8.4E-21n³ (sec) | 7.7E-10 | | Polynomial: time = 1.4E-06 x^{0.32} (sec) | 1.1E-09 | | Logarithmic: time = -8.7E-05 + 1.3E-05log(n) (sec) | 1.9E-09 | | Linearithmic: time = 1.9E-05 + 3E-11nlog(n) (sec) | 9.9E-11 | | Exponential: time = 2.2E-05 1ⁿ (sec) | 2.9E-10 |

Execution Time vs. Input Size Plot:



Complexity Analysis for sigma_k

Best Fit Complexity: Constant: time = 6.1E-05 (sec)

Detailed Fit Residuals: | Complexity Class | Residual | |
 |-----| | Constant: time = 6.1E-05 (sec) | 7E-09 | | Linear: time = 2E-05 + 4.1E-10n (sec) | 2.8E-10 | | Quadratic: time = 3.4E-05 + 1.9E-15n² (sec) | 4.4E-10 | | Cubic: time = 4E-05 + 9.4E-21n³ (sec) | 9.4E-10 | | Polynomial: time = 2.7E-06 x^{0.28} (sec) | 2.1E-09 | | Logarithmic: time = -8.8E-05 + 1.4E-05log(n) (sec) | 2.9E-09 | | Linearithmic: time = 2.2E-05 + 3.3E-11nlog(n) (sec) | 2.5E-10 | | Exponential: time = 2.6E-05 1ⁿ (sec) | 3.2E-10 |

Execution Time vs. Input Size Plot:

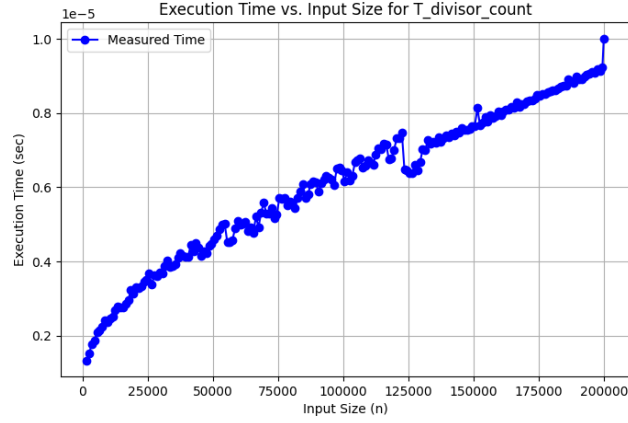


Complexity Analysis for T_divisor_count

Best Fit Complexity: Constant: time = 5.3E-05 (sec)

Detailed Fit Residuals: | Complexity Class | Residual | |
 |-----| | Constant: time = 5.3E-05 (sec) | 5.3E-09 | | Linear: time = 1.7E-05 + 3.6E-10n (sec) | 4.3E-11 | | Quadratic: time = 3E-05 + 1.7E-15n² (sec) | 3.4E-10 | | Cubic: time = 3.5E-05 + 8.1E-21n³ (sec) | 8.1E-10 | | Polynomial: time = 1.7E-06 x^{0.3} (sec) | 1.2E-09 | | Logarithmic: time = -8.3E-05 + 1.2E-05log(n) (sec) | 1.9E-09 | | Linearithmic: time = 1.9E-05 + 2.9E-11nlog(n) (sec) | 4E-11 | | Exponential: time = 2.2E-05 1ⁿ (sec) | 2.8E-10 |

Execution Time vs. Input Size Plot:

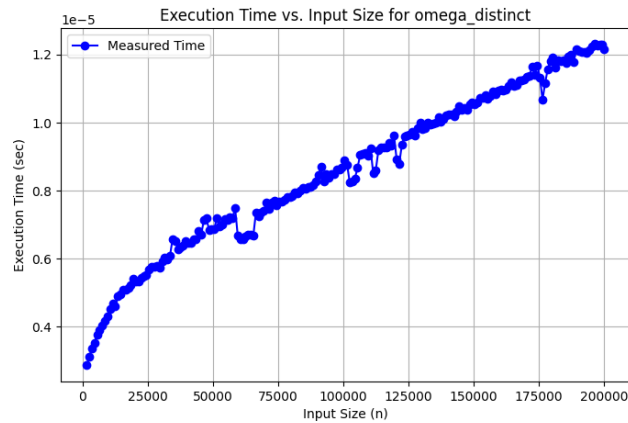


Complexity Analysis for omega_distinct

Best Fit Complexity: Constant: time = $7.8E-05$ (sec)

Detailed Fit Residuals: | Complexity Class | Residual | |
 ————| | Constant: time = $7.8E-05$ (sec) | $1.1E-08$ | | Linear: time = $2.7E-05 + 5.1E-10n$ (sec) | $2.8E-10$ | | Quadratic: time = $4.5E-05 + 2.3E-15n^2$ (sec) | $1.3E-09$ | | Cubic: time = $5.4E-05 + 1.1E-20n^3$ (sec) | $2.5E-09$ | | Polynomial: time = $2.9E-06 x^{0.29}$ (sec) | $2.3E-09$ | | Logarithmic: time = $-0.00012 + 1.8E-05 \log(n)$ (sec) | $3.6E-09$ | | Linearithmic: time = $3E-05 + 4.1E-11 \ln \log(n)$ (sec) | $3.1E-10$ | | Exponential: time = $3.3E-05 1^n$ (sec) | $1.1E-09$ |

Execution Time vs. Input Size Plot:

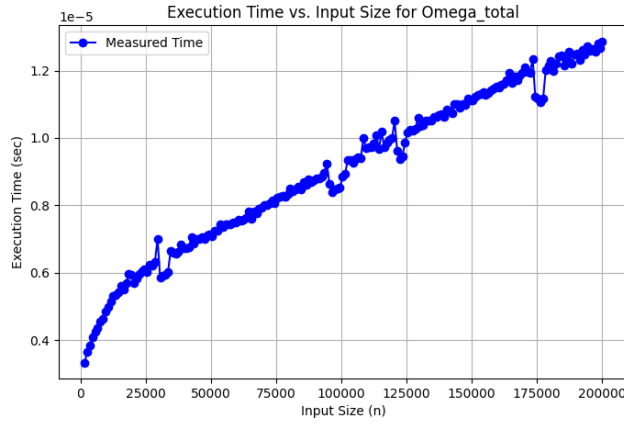


Complexity Analysis for Omega_total

Best Fit Complexity: Constant: time = 8.3E-05 (sec)

Detailed Fit Residuals: | Complexity Class | Residual | |-----|
 -----| | Constant: time = 8.3E-05 (sec) | 1.1E-08 | | Linear: time = 3.1E-05 +
 5.2E-10n (sec) | 3.5E-10 | | Quadratic: time = 4.9E-05 + 2.4E-15n² (sec) |
 1.2E-09 | | Cubic: time = 5.8E-05 + 1.1E-20n³ (sec) | 2.4E-09 | | Polynomial:
 time = 4.4E-06 x^{0.26} (sec) | 3E-09 | | Logarithmic: time = -0.00011 + 1.8E-
 05log(n) (sec) | 4.3E-09 | | Linearithmic: time = 3.3E-05 + 4.2E-11nlog(n)
 (sec) | 3.5E-10 | | Exponential: time = 3.8E-05 1ⁿ (sec) | 9.3E-10 |

Execution Time vs. Input Size Plot:

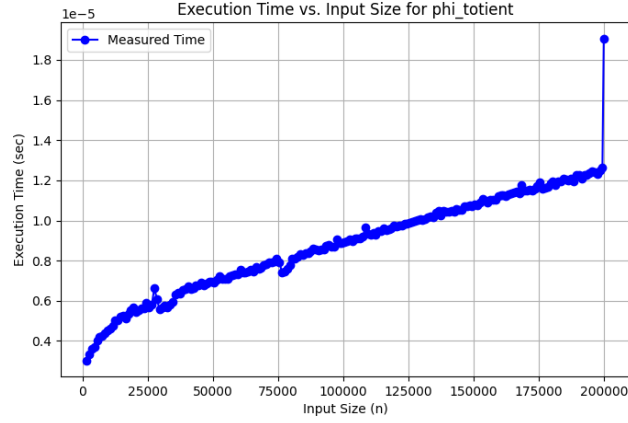


Complexity Analysis for phi_totient

Best Fit Complexity: Constant: time = 7.8E-05 (sec)

Detailed Fit Residuals: | Complexity Class | Residual | |-----|
 -----| | Constant: time = 7.8E-05 (sec) | 1.1E-08 | | Linear: time = 2.7E-05
 + 5E-10n (sec) | 4E-10 | | Quadratic: time = 4.5E-05 + 2.3E-15n² (sec) |
 9.6E-10 | | Cubic: time = 5.3E-05 + 1.1E-20n³ (sec) | 2E-09 | | Polynomial:
 time = 3.9E-06 x^{0.26} (sec) | 3.1E-09 | | Logarithmic: time = -0.00011 + 1.7E-
 05log(n) (sec) | 4.2E-09 | | Linearithmic: time = 3E-05 + 4.1E-11nlog(n) (sec)
 | 3.8E-10 | | Exponential: time = 3.5E-05 1ⁿ (sec) | 7.8E-10 |

Execution Time vs. Input Size Plot:

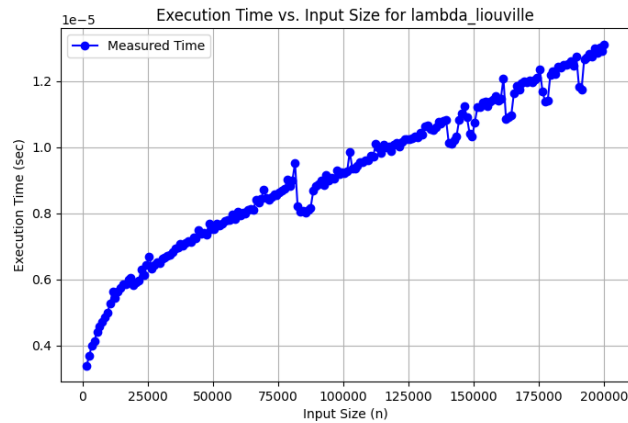


Complexity Analysis for lambda_liouville

Best Fit Complexity: Constant: time = 8.7E-05 (sec)

Detailed Fit Residuals: | Complexity Class | Residual | |
 ———| | Constant: time = 8.7E-05 (sec) | 1.2E-08 | | Linear: time = 3.4E-05 + 5.3E-10n (sec) | 3.8E-10 | | Quadratic: time = 5.3E-05 + 2.4E-15n² (sec) | 1.2E-09 | | Cubic: time = 6.1E-05 + 1.2E-20n³ (sec) | 2.4E-09 | | Polynomial: time = 5.4E-06 x^{0.24} (sec) | 3.3E-09 | | Logarithmic: time = -0.00011 + 1.8E-05log(n) (sec) | 4.6E-09 | | Linearithmic: time = 3.6E-05 + 4.3E-11nlog(n) (sec) | 3.7E-10 | | Exponential: time = 4.1E-05 1ⁿ (sec) | 8.8E-10 |

Execution Time vs. Input Size Plot:

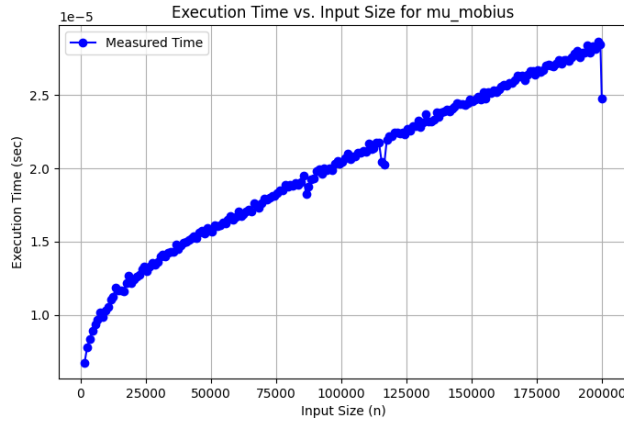


Complexity Analysis for mu_mobius

Best Fit Complexity: Constant: time = 0.00019 (sec)

Detailed Fit Residuals: | Complexity Class | Residual | |
 ——— | Constant: time = 0.00019 (sec) | 7.6E-08 | | Linear: time = $6.8E-05 + 1.2E-09n$ (sec) | 1.7E-08 | | Quadratic: time = $0.00012 + 5.2E-15n^2$ (sec) | 2.8E-08 | | Cubic: time = $0.00014 + 2.3E-20n^3$ (sec) | 3.8E-08 | | Polynomial: time = $4.5E-06 x^{0.33}$ (sec) | 2.2E-08 | | Logarithmic: time = $-0.00031 + 4.5E-05\log(n)$ (sec) | 3E-08 | | Linearithmic: time = $7.5E-05 + 9.7E-11n\log(n)$ (sec) | 1.8E-08 | | Exponential: time = $7.6E-05 1^n$ (sec) | 3E-08 |

Execution Time vs. Input Size Plot:

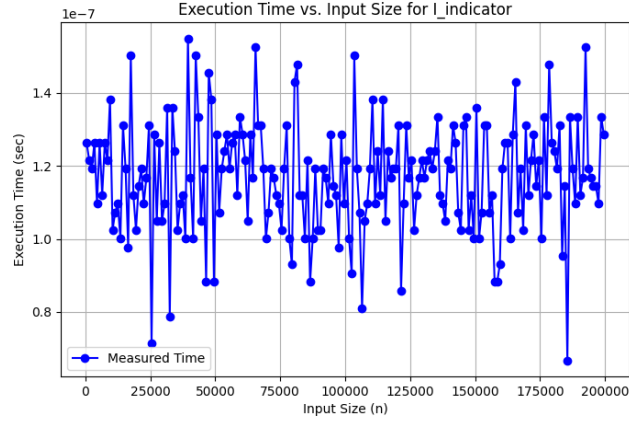


Complexity Analysis for I_indicator

Best Fit Complexity: Constant: time = 9.7E-07 (sec)

Detailed Fit Residuals: | Complexity Class | Residual | |
 ——— | Constant: time = 9.7E-07 (sec) | 1.1E-12 | | Linear: time = $1.4E-06 + -3.9E-12n$ (sec) | 4.6E-13 | | Quadratic: time = $1.2E-06 + -1.5E-17n^2$ (sec) | 6.8E-13 | | Cubic: time = $1.1E-06 + -6.5E-23n^3$ (sec) | 7.8E-13 | | Polynomial: time = $2.4E-06 x^{-0.091}$ (sec) | 8E-14 | | Logarithmic: time = $2.2E-06 + -1.1E-07\log(n)$ (sec) | 5.3E-14 | | Linearithmic: time = $1.3E-06 + -3.1E-13n\log(n)$ (sec) | 4.9E-13 | | Exponential: time = $1.3E-06 1^n$ (sec) | 4.2E-13 |

Execution Time vs. Input Size Plot:

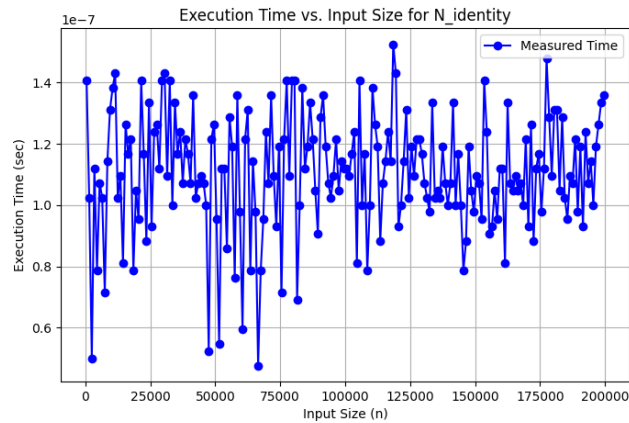


Complexity Analysis for N_identity

Best Fit Complexity: Constant: time = $9.1E-07$ (sec)

Detailed Fit Residuals: | Complexity Class | Residual | |
 ———— | Constant: time = $9.1E-07$ (sec) | $7.5E-13$ | | Linear: time = $1.2E-06 + -3.3E-12n$ (sec) | $3E-13$ | | Quadratic: time = $1.1E-06 + -1.3E-17n^2$ (sec) | $4.4E-13$ | | Cubic: time = $1E-06 + -6.1E-23n^3$ (sec) | $5E-13$ | | Polynomial: time = $2.1E-06 x^{-0.082}$ (sec) | $1.2E-13$ | | Logarithmic: time = $1.9E-06 + -9.1E-08\log(n)$ (sec) | $9.1E-14$ | | Linearithmic: time = $1.2E-06 + -2.7E-13n\log(n)$ (sec) | $3.2E-13$ | | Exponential: time = $1.2E-06 1^n$ (sec) | $2.7E-13$ |

Execution Time vs. Input Size Plot:



Complexity Analysis for is_perfect

Best Fit Complexity: Constant: time = 5.4E-05 (sec)

Detailed Fit Residuals: | Complexity Class | Residual | |
 |-----| | Constant: time = 5.4E-05 (sec) | 5.9E-09 | | Linear: time = 1.7E-05
 + 3.8E-10n (sec) | 1.2E-10 | | Quadratic: time = 3E-05 + 1.7E-15n² (sec) |
 6.9E-10 | | Cubic: time = 3.6E-05 + 8.2E-21n³ (sec) | 1.2E-09 | | Polynomial:
 time = 5.2E-06 x^{0.21} (sec) | 1.6E-09 | | Logarithmic: time = -1.5E-05 + 6.6E-
 06log(n) (sec) | 2.4E-09 | | Linearithmic: time = 1.9E-05 + 3E-11nlog(n) (sec)
 | 1.6E-10 | | Exponential: time = 1.9E-05 1ⁿ (sec) | 9.8E-10 |

Execution Time vs. Input Size Plot:



Complexity Analysis for is_square_free

Best Fit Complexity: Constant: time = 0.00016 (sec)

Detailed Fit Residuals: | Complexity Class | Residual | |
 |-----| | Constant: time = 0.00016 (sec) | 3.1E-07 | | Linear: time = 6.3E-05
 + 1E-09n (sec) | 2.7E-07 | | Quadratic: time = 0.00011 + 3.9E-15n² (sec) |
 2.8E-07 | | Cubic: time = 0.00013 + 1.5E-20n³ (sec) | 2.9E-07 | | Polynomial:
 time = 5.9E-06 x^{0.17} (sec) | 4.5E-07 | | Logarithmic: time = -6.3E-05 + 2.1E-
 05log(n) (sec) | 2.7E-07 | | Linearithmic: time = 6.9E-05 + 8E-11nlog(n) (sec)
 | 2.7E-07 | | Exponential: time = 2.5E-05 1ⁿ (sec) | 4.6E-07 |

Execution Time vs. Input Size Plot:

