

Program I.2: Write programs that estimate the rate of growth of the Cayley numbers.

I coded the following recurrence in Python 2.7:

$$H(i) = \left[ \sum_{j=1}^i \left( \sum_{k=1}^j kH(k) \text{ only if } k \text{ is a factor of } j \right) * H(i-j) \right] * \frac{1}{i-1}$$

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#!/usr/bin/python
def main():
    max = 600 # highest index
    H = [0.] * max
    H[0] = 0
    H[1] = 1
    # calculate each H[i]
    for i in range(2, max):
        outersum = 0
        # calculate the summation term
        for j in range(1, i+1):
            innersum = 0
            # sum up to current index of kH_k
            for k in range(1, j+1):
                if j % k == 0:
                    innersum += k * H[k]
            outersum += innersum * H[i-j]
        H[i] = outersum / (i-1) # finally compute H[i]
    print (H[max-1]/H[max-2])
main()

# Output below
# $python I.2.py
# 2.94836578598
# $
```

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