

Math 242: Modern Computational Mathematics
Homework, due: Monday, February 15, 2012

1. Either derive for yourself or find in a reputable source formulas for the sum of the first n squares and the first n cubes, i.e., find simple formulas involving n for:

- $$\sum_{i=1}^n i^2 = 1^2 + 2^2 + 3^2 + \cdots + n^2$$
- $$\sum_{i=1}^n i^3 = 1^3 + 2^3 + 3^3 + \cdots + n^3$$

Show how you derived the formulas or where you found them.

2. Use the formulas found above to quickly compute the values of

- $$\sum_{i=1}^{1000} i^2$$
- $$\sum_{i=1}^{1000} i^3$$

Show your work.

3. Find the g.c.d. (greatest common divisor) for each pair of integers shown below. You may use Mathematica or R software, or your calculator, to help with the computations. Showing intermediate computations on paper, use both methods (prime factorization and Euclid) and indicate which method is faster. (For the third pair, you can give up on the factorization approach if you've considered more than 20 prime numbers in your attempt to factor.)

(a) 388, 248

(b) 798, 27094

(c) 6831903611, 247308728