Monday, Week 3

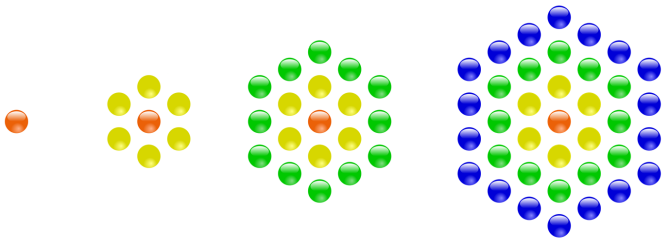
Warmup

Evaluate:

1. $5! =$
2. The sum of all primes less than $15 =$
3. $1 + 2 + 3 + \ldots + 7 =$
4. $1 + 2 + 4 + 8 + \ldots + 64 =$
5. $1 + \pi + (-3) + 6.6 + \ldots + 41 =$

Sums and Products

How many circles?



1. What is $\sum_{i=1}^{3}\sum_{j=1}^{2} i+j$? What about $\sum_{j=1}^{2}\sum_{i=1}^{3} i+j$?

2. What is $\prod_{i=1}^{2}\prod_{j=1}^{2} i+j$? What about $\prod_{j=1}^{2}\prod_{i=1}^{2} i+j$?

3. What is $\sum_{i=1}^{2}\prod_{j=1}^{2} i+j$? What about $\prod_{j=1}^{2}\sum_{i=1}^{2} i+j$?

Big-Oh Notation

Which of these statements seems most correct?

1. When n is large, $n^2 + \ln(n) + 2^n$ is approximately n^2.
2. When n is large, $n^2 + \ln(n) + 2^n$ is approximately $\ln(n)$.
3. When n is large, $n^2 + \ln(n) + 2^n$ is approximately 2^n.

Suppose it takes L time to add two n-digit numbers. About long does it take to add two numbers with twice as many digits?

Suppose it takes M time to multiply two n-digit numbers. About long does it take to multiply two numbers with twice as many digits?

L'Hospital's Rule

What is L'Hospital's Rule? If $f(x), g(x)$ are real-valued functions where $\lim_{x\to\infty} f'(x)$ and $\lim_{x\to\infty} g'(x)$ exist, then $\lim_{x\to\infty} f(x)/g(x) =$

Show that $\ln(x)$ is $O(x^c)$ for any $c > 0$.