COS 488 Week 3: Q3

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February 24, 2017

$$(3N)!/(N!)^3 = exp(ln(3N)! - 3ln(N!))$$

and then applying stirling's approximation, we get:

$$= exp((3N + .5)ln(3N) - 3N + ln(\sqrt{2\pi}) - 3((N + .5)lnN - N + ln(\sqrt{2\pi}) + O(1/N))$$

$$= exp((3N + .5)ln3 - lnN - 2ln(sqrt2\pi) + O(1/N)) = \frac{\sqrt{3} \cdot 27^N}{2\pi N}(1 + O(1/N))$$

(Worked with Maryam B.)