FINITE CALCULUS TUT

1. Use $k^3 = k^{\underline{3}} + 3k^{\underline{2}} + k^{\underline{1}}$ to show that

$$0 \leq k < n \sum_k 3 = \frac{n(n-1)}{2}{}_{(}2$$

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2. Use partial fractions to show

$$1 \leq k \leq n \sum \frac{Hk+1-Hk}{k} 1 - \frac{Hk+1-Hk1}{kn+1}$$

3. Use partial fractions to show

$$1 < k \leq n \sum \quad \frac{H_{k+1} - H_k}{k} = 2 - \frac{1}{n} - \frac{Hn}{n}$$

Use falling factorials to evaluate

4. $1 \cdot 2 + 2 \cdot 3 + ... + (n-2) \cdot (n-1)$,

5. $\frac{1}{1\cdot} \quad + \quad \frac{11}{1\cdot 2\cdot 3} ... + n(n+1) \frac{111}{1\cdot 2\cdot 3}$

6. $k = 0 \sum^2 \quad \binom{k}{m} = \binom{n+1}{m+1}$

7. Use partial summation to computw $0 \leq k < n \sum \quad H_k$

8. Compute $1 \leq k \leq n \sum \quad H_k$ by using the double sum $1 \leq i \leq k \leq n \sum \quad \frac{1}{i}$

Solution to 7.