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Assignment 2 : Asymptotic Analysis of Algorithms.

1. Compute the following sums

a) $$\sum_{i=3}^{n+1} 1 = 1(n+1) - 2 = n+1-2 = \underline{\underline{n-1}}$$

b) $$\sum_{i=3}^{n+1} i = \frac{(n+1)(n+1+1)}{2} - 3$$

$$= \frac{(n+1)(n+2)}{2} - 3 = \frac{(n+1)(n+2)-6}{2}$$

$$= \frac{n^2+2n+n+2-6}{2} = \underline{\underline{\frac{n^2+3n-4}{2}}}$$

c) $$\sum_{i=3}^{n+1} i \times (i+1) = \sum_{i=3}^{n+1} i^{\circ} + i$$

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

$$= \frac{(n+1)(n+2)(2n+3)}{6} - 5 + \frac{(n+1)(n+2)}{2} - 3$$

$$= \frac{(n+1)(n+2)}{2}\left[\frac{2n+3}{3}+1\right]-8$$

$$\frac{(n+1)(n+2)}{2}\left[\frac{2(n+3)}{3}\right]-8$$

$$\frac{(n+1)(n+2)(n+3)}{3}-8$$

d) $\displaystyle\sum_{i=3}^{n+1} \frac{1}{i \times (i+1)}$

$$\sum_{i=3}^{n+1} \frac{(i+1)-i}{i(i+1)} = \sum_{i=3}^{n+1} \frac{1}{i} - \frac{1}{i+1}$$

$$\sum_{i=3}^{n} \frac{1}{i} - \sum_{i=3}^{n+1} \frac{1}{i+1} \qquad (i+1) \simeq i$$

$$\sum_{i=3}^{n+1} \frac{1}{i} \simeq \underline{\underline{\ln n}}$$