A Few Ideas which may be helpful in completing Homework 2
Biochem 21a Fall 2004

1. Geometric Series

Let

$$s = 1 + a + a^2 + a^3 + a^4 + \dots \tag{1}$$

Then

$$as = a + a^2 + a^3 + a^4 + a^5 + \dots \tag{2}$$

so

$$s - as = 1 \Rightarrow s = \frac{1}{1-a} \tag{3}$$

2. Arithmetic-Geometric Series

Let

$$s = 1 + 2a + 3a^2 + 4a^3 + 5a^4 + \dots \tag{4}$$

Then

$$\begin{array}{rcccccccccc} s & = & 1 & + & a & + & a^2 & + & a^3 & + & a^4 & + & \dots \\ & & & + & a & + & a^2 & + & a^3 & + & a^4 & + & \dots \\ & & & & & + & a^2 & + & a^3 & + & a^4 & + & \dots \\ & & & & & & & + & a^3 & + & a^4 & + & \dots \\ & & & & & & & & & + & a^4 & + & \dots \\ & & & & & & & & & & & + & \dots \\ & & & & & & & & & & & & \ddots \end{array} \tag{5}$$

$$\begin{array}{rcc} = & & \frac{1}{1-a} \\ & + & \frac{a}{1-a} \\ & + & \frac{a^2}{1-a} \\ & + & \frac{a^3}{1-a} \\ & + & \frac{a^4}{1-a} \\ & + & \dots \end{array} \tag{6}$$

$$= \frac{1}{1-a}(1 + a + a^2 + a^3 + a^4 + \dots) = \frac{1}{(1-a)^2} \tag{7}$$