Convener Summary

Assignment #2

#1. a) $\sum_{i=2}^{n}(i-1)i = 2+6+12+\dots+(n-1)n$

b) $\sum_{i=1}^{n}[a+(i-1)b] = a+(a+b)+(a+2b)+\dots+[a+(n-1)b]$

c) $\sum_{i=1}^{n=34}[1+3(n-1)] = 1+4+7+10+\dots+100$

d) $\sum_{i=0}^{n-r}\binom{n-i}{r} = \binom{n}{r}+\binom{n-1}{r}+\binom{n-2}{r}+\dots+\binom{r}{r}$

#2. a) $\sum_{i=0}^{n}(a+bi)^2 = a^2+(a+b)^2+(a+2b)^2+\dots+(a+nb)^2$

$= (n+1)a^2 + ab(n+1)n + b^2n(n+1)(2n+1)/6$

b) $\sum_{i=0}^{n} i(i+1)(i+2) = 0+6+24+\dots+n(n+1)(n+2)$

$= n(n+1)(n+2)(n+3)/4$

c) $\sum_{i=2}^{n}\binom{i}{2} = \binom{2}{2}+\binom{3}{2}+\binom{4}{2}+\dots+\binom{n}{2}$

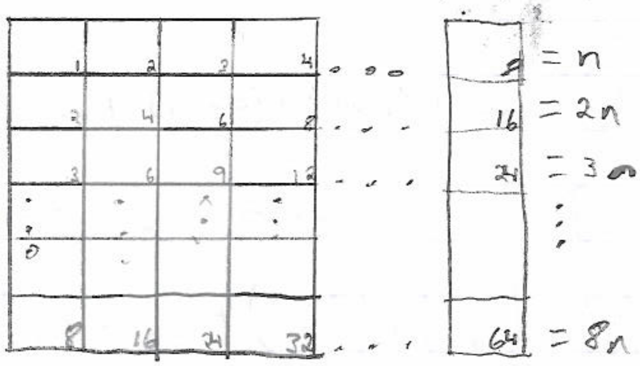
$= \binom{n+1}{3}$

d) $\sum_{i=0}^{n}\binom{i}{3} = \binom{3}{3}+\binom{4}{3}+\binom{5}{3}+\dots+\binom{n}{3}$

$= \binom{n+1}{4}$

#3. The number of ways of choosing $k+1$ elements from a set of $n+1$ elements is equal to the number of ways of choosing k elements from a set of n elements added to the number of ways of choosing $k+1$ elements from a set of n elements. This can be seen by treating the $+1$ in $n+1$ as an extra element. If this element is in a specified subset of $n+1$, there are $\binom{n}{k}$ subsets in total of this type. The number of subsets that do not contain this extra element is $\binom{n}{k+1}$ (since you are choosing $n+1$ elements in total but not the extra element, or $\cancel{\binom{n+1}{k+1}}$), The subsets contain the extra element added to the subsets that do not contain the extra element gives the whole set of $\binom{n+1}{k+1}$, so $\binom{n}{k}+\binom{n}{k+1}=\binom{n+1}{k+1}$

\#4. A trick is to observe the numbers of rectangles that end in each bottom right corner.



where 'n' is the natural number sum up to the number of columns (8 in this case)

n is $\frac{8 \cdot 9}{2} = 36$

total = natural # sum of rows · n
$= 36 \cdot 36$
$= 1296$ rectangles in total