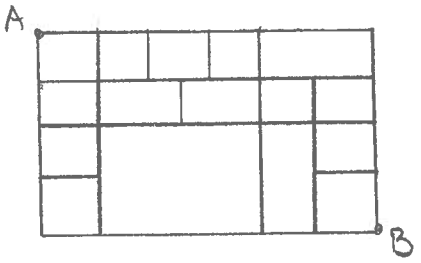
Day 31

Review

① Find the numerical coefficient of the term containing x^7 in the complete, simplified expansion of $(3x^2 - \frac{1}{x})^8$.

② There will be five sections on the Pre-Calculus 12 Final Exam, one for each unit test given. You can choose to write any number of them to better your final mark. How many ways can you proceed?

③ Determine the number of pathways from A to B if you can only move down or right along the lines in the diagram to the right.



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① $n=8$, $a=3x^2$, $b=-\frac{1}{x}$, $r=?$

NOT clear ... b/c both a & b contain x, it's not that simple

Use $t_{r+1} = {}_nC_r\, a^{n-r} b^r$

$= {}_8C_r\,(3x^2)^{8-r}\left(-\frac{1}{x}\right)^r$

$= {}_8C_r\,(3)^{8-r}(x^2)^{8-r}(-1)^r(x^{-1})^r$

$= \underbrace{{}_8C_r\,(3)^{8-r}(-1)^r}_{\text{coefficient}} \cdot \underbrace{x^{2(8-r)}x^{-r}}_{\text{power of } x}$

We want $x^{2(8-r)}x^{-r} = x^7$

$x^{2(8-r)-r} = x^7$

$\therefore 2(8-r)-r = 7$

$16-3r = 7$

$3r = 9$

$r = 3$

Therefore, coefficient is ${}_8C_3 \cdot 3^5 \cdot (-1)^3 = -13608$. (term is $-13608x^7$)

② So you can choose to write: 0, 1, 2, 3, 4 or 5 sections,

corresponding to these cases: ${}_5C_0 + {}_5C_1 + {}_5C_2 + {}_5C_3 + {}_5C_4 + {}_5C_5$

$= 1 + 5 + 10 + 10 + 5 + 1$

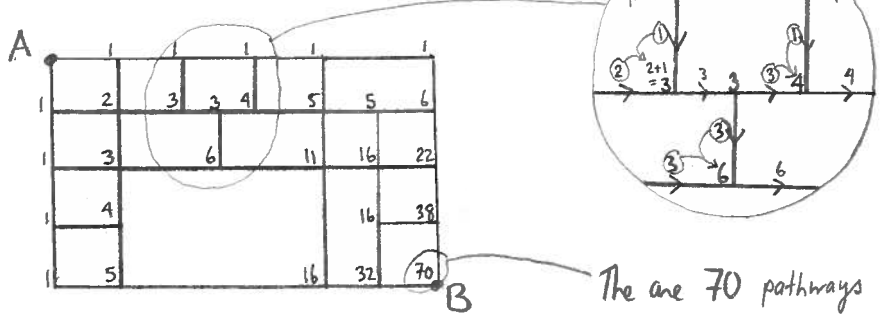
$= 32$

} notice these are the entries in the n=5 row (i.e. 6th row) of Pascal's Triangle and their sum is $2^5 = 32$

-OR- For each of the 5 sections, you can choose to do it or not i.e. Yes or No (that's 2 options for each)

$$\underset{\text{Y or N}}{2} \cdot \underset{\text{Y or N}}{2} \cdot \underset{\text{Y or N}}{2} \cdot \underset{\text{Y or N}}{2} \cdot \underset{\text{Y or N}}{2} = 2^5 = 32$$

③ This one is too complicated for perms & coms ... use the pattern strategy seen in Pascal's Triangle ☺



HWK: lots of combinatorics practice in the Combinatorics Review and/or Homework booklets online ☺