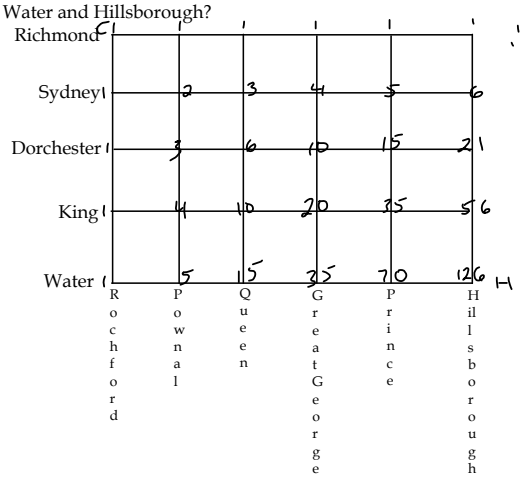
Pascal's Triangle (11.3)

p542 day 5

ex1: How many ways can you walk from the Culinary to the corner of Water and Hillsborough?



Pascal's Triangle (11.3)

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so Pascal's Triangle gives us the number of ways that we can combine different options.

Evaluate ${}_0C_0$ ${}_1C_0$ ${}_1C_1$ ${}_2C_0$ ${}_2C_1$ ${}_2C_2$ ${}_3C_0$ ${}_3C_1$ ${}_3C_2$ ${}_3C_3$

nCr

compare

1 — row 0
1 1 — row 1
1 2 1 — row 2
1 3 3 1 — row 3
1 4 6 4 1 — row 4
1 5 10 10 5 1 — row 5

Pascal's Triangle (11.3)

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ex2: You invite 6 friends over for the Super Bowl, but you're not sure how many, if any, are coming. How many different combinations could happen?

use row 6

case 0: ${}_6C_0$ 1
case 1: ${}_6C_1$ 6
case 2: ${}_6C_2$ 15
case 3: ${}_6C_3$ 20
case 4: ${}_6C_4$ 15
case 5: ${}_6C_5$ 6
case 6: ${}_6C_6$ 1

64 ways

1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1
1 6 15 20 15 6 1

The Binomial Theorem (11.3)

p542 day 5

ex3: Expand

$(x+1)^2 = x^2+2x+1$

$(x+1)^3 = x^3+3x^2+3x+1$

$(x+1)^4 = x^4+4x^3+6x^2+4x+1$

$(x+1)^5 = x^5+5x^4+10x^3+10x^2+5x+1$

what do we notice about the coefficients?

The Binomial Theorem (11.3)

p542 day 5

ex4: Expand

$(a+b)^3 = 1a^3+3a^2b^1+3a^1b^2+1b^3$

$(x+y)^4 = x^4+4x^3y+6x^2y^2+4xy^3+y^4$

$(m-n)^3 = m^3+3m^2(-n)^1+3m(-n)^2+(-n)^3$
$= m^3-3m^2n+3mn^2-n^3$

$(x+3)^4 = x^4+4x^3(3)^1+6x^2(3)^2+4x(3)^3+(3)^4$
$= x^4+12x^3+54x^2+108x+81$

$(4a-3b)^3 = (4a)^3+3(4a)^2(-3b)^1+3(4a)^1(-3b)^2+(-3b)^3$
$= 64a^3-144a^2b+108ab^2-27b^3$