real purpose of education:

to learn how to learn (to learn how to teach yourself new ideas & methods)

meta-code (process of problem-solving)

when you encounter a new problem $P$, it's often helpful to find another problem $P'$

Hold with 2 properties:

1. $P'$ is similar in (all) relevant ways
2. you know how to solve $P'$

Then you can use solution to $P'$ to
to help it so many phen. THEN

$P_{old}$

T-S case $\Rightarrow P(1 \text{ or more T-S babies in family of } h = 5 \text{ kids, both parentscamera})$

$\square \quad \square$ \hspace{1cm} $P(T-S \text{ on any 1 trial}) = p = \frac{1}{4}$

2 (4) $P(\text{at least 1 GP among } 182,900,000 \text{ lottery participants})$

$\square \quad \square$ \hspace{1cm} $p(\text{GP}) = p = \frac{1}{292,201,388}$

$\square \quad \square$ \hspace{1cm} $P(\text{at least one success in IID})$

IFD success-failure trials, $\downarrow$

$P(\text{success on any 2 trials}) = \square = 1 - (1-p)^2$
$\Pr = P(\text{we hire best person with quality pool of size } r)$

As $r \uparrow$, we get more & better info about quality of applicants, but as $r \uparrow$ our chance of not hiring best person because that person is in $\mathcal{R}_P$.
meta-code (process of problem-solving)

we almost choose a point on this line

when the problem of interest is too obstruct to see useful patterns,

general:

set playfield: pick some specific numbers \( n \) and \( r \), \( 1 \leq n \), \( 0 \leq r < n \)

play around with \( r + 1 \)

\[
\begin{array}{c|c|c|c}
 n & r & \text{QP} & \text{hiring pool with applicants} \\
 8 & 3 & 41 & 27 \quad \text{slot filling} \\
\end{array}
\]
Assume no ties in quality assessment.

Invent quality score, from 0 - 100.

Pick $i > r$; e.g., $i = 5$.

4.1-72 50 \[ \frac{41}{72} = \frac{50}{q} \]

\[ r \]

4.4 $p_{ij} = \frac{r}{i} = \frac{3}{5}$

4.6 $p(A1 | B_i) = 0$ for $i \leq r$.
\[ p_r = P(A \text{ having pre-specified } r \text{ before interviewing begins}) \]

\[ p_0 = \frac{1}{n} \]

\[ 0 < r < n \]

\[ p_r = \frac{r}{n} \quad \text{for } i = r+1, \ldots, n \]

\[ P(A) \text{ hard} \]

\[ P(A|E_i) \text{ easy} \]

\[ P(A1B_i) = \begin{cases} 0 & \text{for } i \leq r \\ \frac{r}{n} & \text{for } i > r \end{cases} \]

\[ P(B_i) = \frac{1}{n} \]
\[ P(A) = P \left[ \left( A \text{ and } B_1 \right) \lor \left( A \text{ and } B_2 \right) \lor \cdots \lor \left( A \text{ and } B_n \right) \right] \]

mutually exclusive

\[ = P \left( A \text{ and } B_1 \right) + P \left( A \text{ and } B_2 \right) + \cdots + P \left( A \text{ and } B_n \right) \]

\[ = P(B_1) P(A | B_1) + P(B_2) P(A | B_2) + \cdots + P(B_n) P(A | B_n) \]

\[ P(B_i) = \frac{1}{n} \]

\[ P(A | B_i) = \begin{cases} \frac{1}{r} & \text{for } i \leq r \\ \frac{1}{i-1} & \text{for } i > r \end{cases} \]

\[ 2r = (p_r - p_{r-1}) \text{ for } 1 \leq r \leq n \]
\[ E_1 = (p_i - p_o) \quad E_2 = (p_2 - p_1) \]

\[ \Sigma r = p_r - p_{r-1} \]

\[ E_1 = \left( \frac{1}{n^2} \sum_{i=1}^{n} \frac{1}{i(i+1)} \right) - \frac{1}{n} \]

\[ p_r = \frac{r \sum_{i=r+1}^{n} \frac{1}{i}}{n} \]
\[ E_2 = \frac{1}{2} - 1 \]

\[ \left( \frac{\sum_{i=3}^{n} \frac{1}{i}}{n} \right) - \left( \frac{\sum_{i=2}^{n} \frac{1}{i}}{n} \right) \]

\[ \sum_{i=2}^{n} \frac{1}{i} = \frac{1}{2} + \frac{1}{3} + \ldots + \frac{1}{n-1} \]

\[ \sum_{i=2}^{n} \frac{1}{i} = 1 + \frac{1}{2} + \ldots + \frac{1}{n-1} \]

\[ \sum_{i=1}^{\infty} \frac{1}{i} = 1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \ldots \]

\[ = +\infty \]