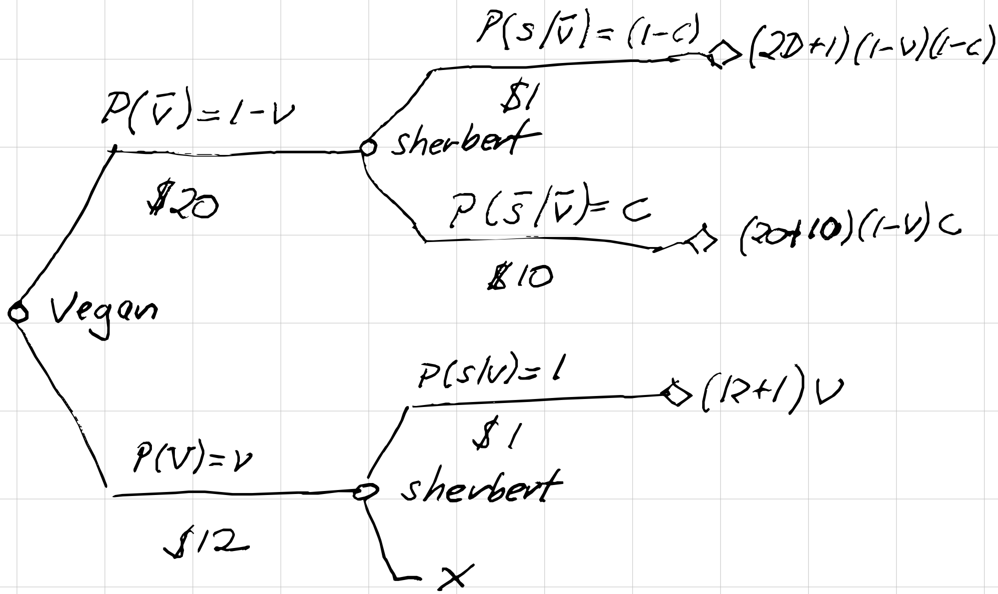
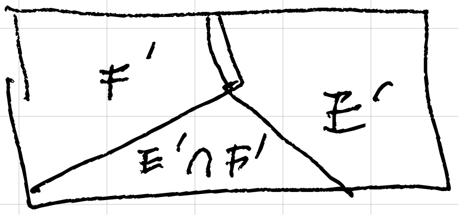
Taking Expectation by "rolling back" a Tree

$$= 21(1-v)(1-c) + 30(1-V)c + 13(V)$$



27 Feb '24

$$P(A|B) = \frac{P(A \cap B)}{P(B)}$$



$E' \cap F' = G$

$P(E), P(F), P(G) \neq 0$

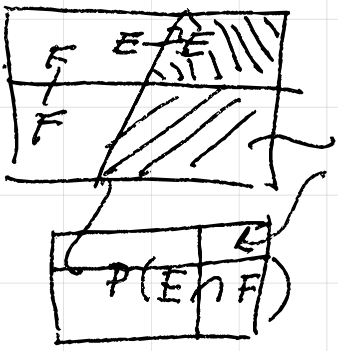
$P(E') = P(F) + P(G)$

$P(F') = P(E) + P(G$

$P(E' \cup (E \cap F') \cup \overbrace{(E \cap F \cap G')}^{\emptyset})$

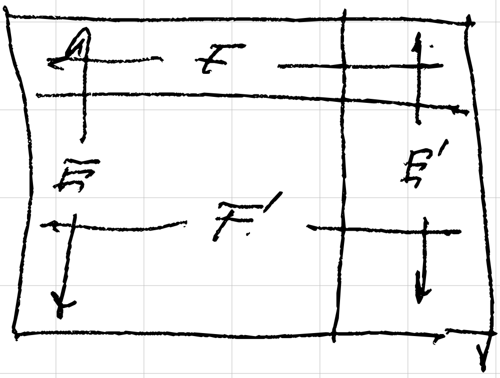
$P(E' \cup E \cup \quad)$

$P(\Omega) \cup ? = \Omega = 1$ ✓



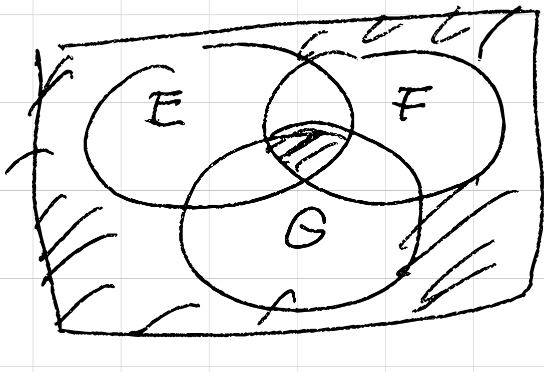
$P(E' \cap F')$

$P(E|F) = P(E)$



$P(A \cup B) = P(A) + P(B)$

$(A \cap B) = \emptyset$



$$P(E)\,P(F) = P(E|F)\,P(F) = 0$$

$$\longrightarrow \quad P(E \cap F) = 0 \rightarrow P(E|F) = 0$$

$$P(E' \cap F') = 0 \quad P(F'|E') = 0$$

$$P(E|\,P(F'|E') = P(F')\,P(E')$$

$$0 = P(F')$$

$\boxed{A^tA}$ = L.I: $\quad a_1v_1 + a_2v_2 + a_3v_3 = 0 \Rightarrow a_1\,a_2\,a_3 = 0$

$$\begin{bmatrix} r_1 & — \\ r_1 & — \\ r_3 & — \end{bmatrix} \begin{bmatrix} v_1 & v_1 & v_3 \\ | & & \\ | & & \end{bmatrix} = \left.\begin{bmatrix} \|w\| & \|v\| & 0 \\ \|v\| & \|v_2\| & 0 \\ 0 & 0 & v \end{bmatrix}\right\}$$

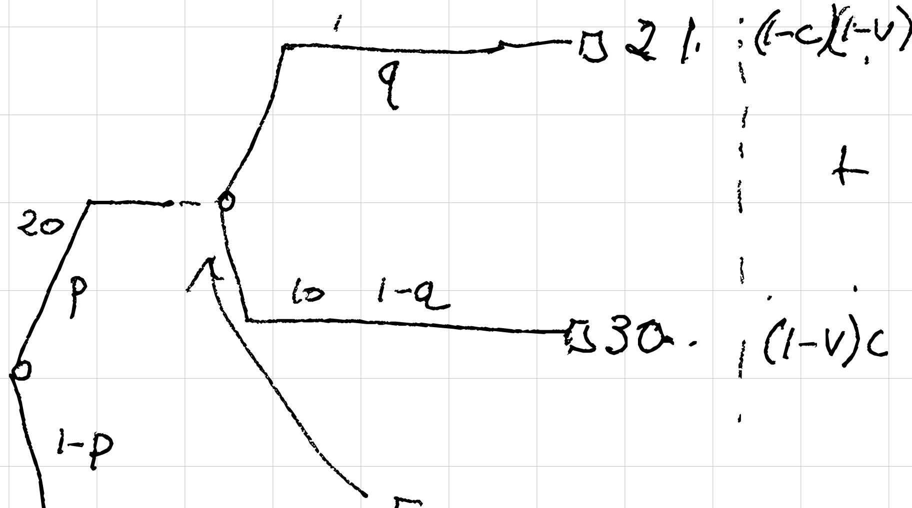
$$A^T = A \qquad (r_1 \cdot v_1) = \|v\|$$

$$\begin{bmatrix} v_1 & v_2 & v_3 \\ | & | & | \\ | & | & | \end{bmatrix} \begin{bmatrix} a_1 \\ a_2 \\ a_3 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$$

$$\begin{array}{cc} L^{-1} & U \\ \begin{bmatrix} 1 & 0 & 0 \\ -1 & 1 & 0 \\ 0 & 1 & 1 \end{bmatrix} & \begin{bmatrix} 1 & 1 & 0 \\ 0 & -1 & 1 \\ 0 & 0 & 2 \end{bmatrix} \end{array} \begin{array}{l} R_1 \\ R_2 \rightarrow \quad R_2' = R_2 - R_1 \\ R_3 \quad\quad R_3' = R_2 + R_3 \end{array}$$

$$2a_3 = 0 \rightarrow a_3$$

$$U \begin{bmatrix} a \\ a_2 \\ a_3 \end{bmatrix} = 0$$



$p[q u_1 + (1-q) u_2] +$

$(1-p)[\quad]$

$21(1-c)(1-v) + 30(1-v)c =$

$(1-v)[21(1-c) + 30c]$

$21 + c(-21 + 30)$

$(1-v)[21 + (1-9)c]$

Midterm practice 'Probability 2'

6 math books 4 physics

MMMMMM PPPP

P(a series of 'MMM' appears in permutations of 10 books).

Basic concept: Each slot in the permutation is one choice out of the n possible.

one of 10

one of 10

two out of 10

P M P ... P

1 2 3 4 5 ... 10

Essentially we are choosing a permutation of indexes of length 4

1,3,7,10 | chose 4 things out of 10 $\binom{10}{4} = \binom{10}{6}$ since $\binom{n}{r} = \binom{n}{n-r}$

Trick: consider the sequence MMM as another item. So there are only 8 slots - one with 'MMM'

$$= \binom{8}{4}\binom{8}{1}\binom{8}{3}$$

Physics books MMM remaining math books.

$$= \frac{(8\cdot7\cdot6\cdot5)}{4\cdot3\cdot2}\frac{(8)}{1}\frac{(8\cdot7\cdot6)}{3\cdot2} = \text{total combinations}$$

But that's a different problem.

We are looking for the occurrence of a particular combination $\{M_1 M_2 M_3\}$ out of the 10: $\binom{10}{3}$

My sol^n is $\frac{|\#\text{ of 3 math combinations}|}{|\text{all 8 slot orderings}|} =$

$$\frac{\binom{10}{3}}{\binom{8}{4}\binom{8}{1}\binom{8}{3}} = \frac{3}{784}$$