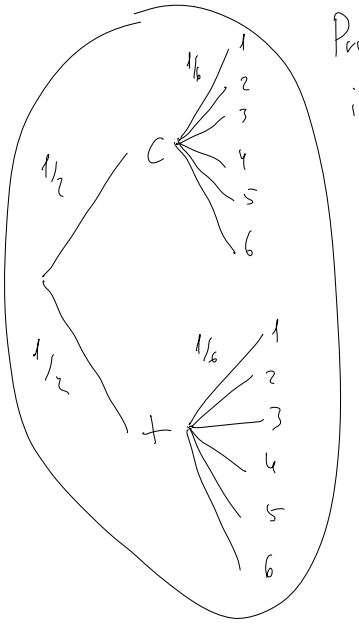
UD 13.- Azar y probabilidad parte 4. Pruebas compuestas, probabilidad total y fórmula de Bayes.

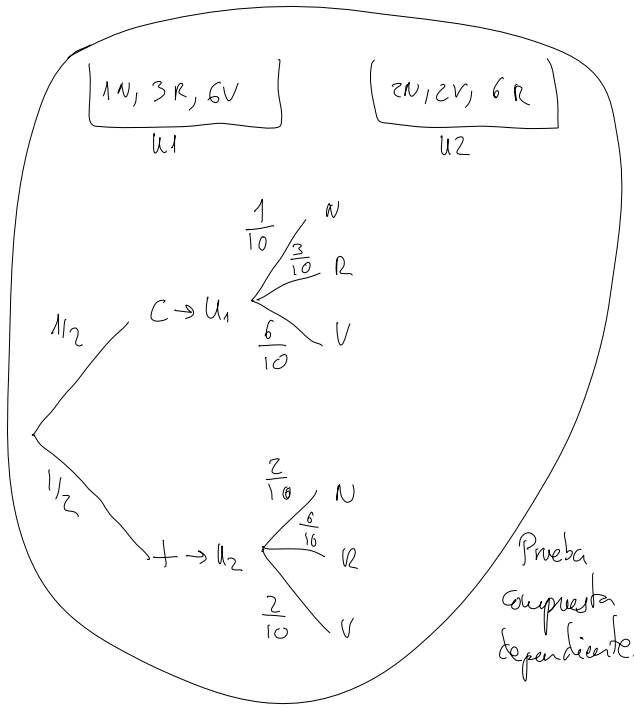
viernes, 10 de abril de 2020 13:58

5. Pruebas compuestas

Ejemplo



Prueba compuesta independiente.

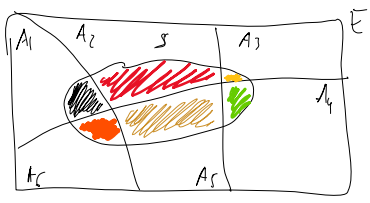


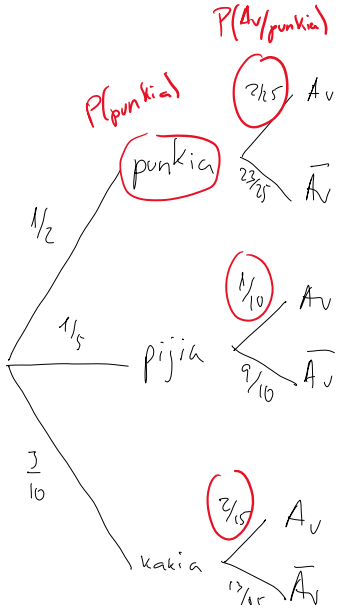
Prueba compuesta dependiente.

6. Probabilidad total

Sean n sucesos $A_1, A_2, \dots, A_n$ de forma que son incompatibles dos a dos y $A_1 \cup A_2 \cup \dots \cup A_n = E$. Entonces para cualquier suceso S se verifica:

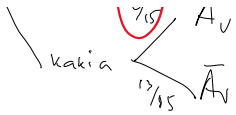
$$P(S) = P(A_1)\,P(S/A_1) + P(A_2)\,P(S/A_2) + \dots + P(A_n)\,P(S/A_n)$$





$$P(A_V) = \frac{1}{2}\cdot\frac{2}{25} + \frac{1}{5}\cdot\frac{1}{10} + \frac{3}{10}\cdot\frac{2}{15} =$$

$$= P(\text{punkia})\,P(A_V/\text{punkia}) + P(\text{pijia})\,P(A_V/\text{pijia}) + P(\text{kakia})\,P(A_V/\text{kakia})$$



$$P(A_v) = p(\text{punkia})\,p(A_v/\text{punkia}) + p(\text{pijia})\,p(A_v/\text{pijia}) + p(\text{kakia})\,p(A_v/\text{kakia}) = \frac{1}{2}\cdot\frac{2}{25} + \frac{1}{5}\cdot\frac{1}{10} + \frac{3}{10}\cdot\frac{2}{15} = \frac{1}{10}$$

7. Fórmula de Bayes

Si tenemos $A_1, A_2, \dots, A_n$ n sucesos tales que son incompatibles dos a dos y $A_1 \cup A_2 \cup \dots \cup A_n = E$ entonces:

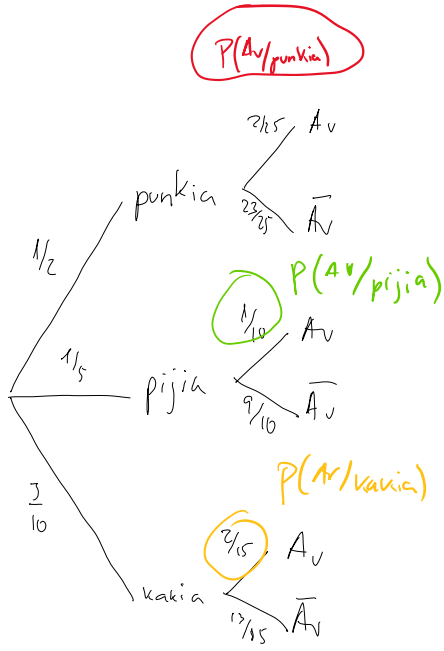
$$P(A_i/S) = \frac{P(A_i)\cdot P(S/A_i)}{P(A_1)P(S/A_1) + P(A_2)P(S/A_2) + \dots + P(A_n)P(S/A_n)}$$

$$P(A_i/S) = \frac{P(A_i \cap S)}{P(S)}$$

$$P(A_i \cap S) = P(A_i)\,P(S/A_i)$$

$$P(A_i \cap S) = P(S)\,P(A_i/S)$$

Ejemplo



$$P(\text{punkia}/A_v) = \frac{P(\text{punkia})\,P(A_v/\text{punkia})}{P(A_v)} =$$

$$= \frac{P(\text{punkia})\,p(A_v/\text{punkia})}{P(\text{punkia})\,p(A_v/\text{punkia}) + p(\text{pijia})\,p(A_v/\text{pijia}) + p(\text{kakia})\,p(A_v/\text{kakia})} =$$

$$= \frac{\frac{1}{2}\cdot\frac{2}{25}}{\frac{1}{10}} = \frac{\frac{2}{50}}{\frac{1}{10}} = \frac{20}{50} = \frac{2}{5}$$