Sai Nikhil (02/10/2021) thirandas.s@northeastern.edu

---

**Problem 1.** *The blood type among Americans is approximately distributed as: 37% type A, 13% type B, 44% type O, and 6% type AB. Suppose the blood types are distributed the same in both male and female populations. And assume that the blood types are independent of marriage.*
*(A) An individual with type B blood can safely receive transfusions only from persons with type B or type O blood. What is the probability of a husband has type B or type O blood? If a woman has type B blood, what is the probability that her husband is an acceptable donor for her?*
*(B) What is the probability that in a randomly chosen couple the husband has type A blood and the wife has type B blood?*

*Solution.* Given,

$$\begin{aligned} P(A) &= 0.37 \\ P(B) &= 0.13 \\ P(O) &= 0.44 \\ P(AB) &= 0.06 \end{aligned}$$

(A)

$$P(B \cup O) = P(B) + P(O) - P(B \cap O)$$

We know that, $B$ and $O$ are independent events. Hence, $P(B \cap O) = 0$.

$$P(B \cup O) = 0.13 + 0.44 - 0 = \boxed{0.57}$$

Acceptable donor for woman $\implies$ husband has type B or type O. This is same as,

$$P(B \cup O) = \boxed{0.57}$$

□