| | | Preference for Location | | |
|---|---|---|---|---|
| | | Hotel | Rec Center | Total |
| Preference for Band | Hip-Hop | 73 | 80 | |
| | Classic Rock | 55 | 92 | |
| Total | | | | |

Suppose you pick a student at random from this class. Find each of the following probabilities.

a. P(*prefers hotel*)

b. P(*prefers hip-hop band*)

c. P(*prefers hotel and prefers hip-hop band*)

d. P(*prefers hotel or prefers hip-hop*)

e. $P(prefers\ hotel|prefers\ hip-hop\ band)$

f. $P(prefers\ hip-hop\ band|prefers\ hotel)$

3. Recall that events A and B are independent if knowing whether one of the events occurs does not change the probability that the other event occurs.

a. Using the data from problem 1, suppose you pick a student at random. Find $P(wearing\ sneakers|is\ a\ girl)$. How does this compare to *P(wearing sneakers)*? $P=(\text{sneakers}|\text{Girl}) = \frac{6}{10}$ $P=(\text{Sneakers}) = \frac{20}{30}$

b. Are the events *wearing sneakers and is a girl independent*? Why or why not?

No $P(\text{sneakers}|\text{Girl}) \neq P(\text{Sneakers})$

$P = \frac{\text{Favorable}}{\text{total}}$

$P(A) \stackrel{?}{=} P(A|B)$

$\frac{32}{75} \stackrel{?}{=} \frac{73}{153}$

$.42 \neq .47$

c. Consider this table from a different class.

| | Wearing Sneakers | Not Wearing Sneakers | total |
|---|---|---|---|
| Boy | 5 | 9 | 14 |
| Girl | 10 | 18 | 28 |
| total | 15 | 27 | 42 |

Suppose you pick a student at random from this class.

i. Find P(wearing sneakers). $= \frac{15}{42}$

ii. Find P(*wearing sneakers*|*is a girl*). $\frac{10}{28}$

iii. Are the events *wearing sneakers and is a girl* independent?

$P(\text{Sneakers}) = P(\text{Sneakers}|\text{Girl})$ $\quad \frac{5}{14} = \frac{5}{14}$ $\quad \frac{15}{42} = \frac{10}{28}$

d. If events A and B are independent, how are P(A) and P($A|B$) related? $P(A) = P(A|B)$

4. Suppose that you roll a pair of dice.

a. Which is greater? P(doubles) or P(*doubles*|*sum is* 2)?

$P(\text{Doubles}) = \frac{1}{6}$ $\quad P(\text{Doubles}|\text{sum 2}) = \frac{1}{1} = 1$

b. Are the events getting doubles and getting a sum of 2 independent? How would you describe the relationship?

5. Refer to the table in Problem 2.

a. If you select a junior at random, are the events *prefer hotel and prefers hip-hop band* independent? Explain.

$P(\text{Hotel}) = P(\text{Hotel}|\text{Hip-hop Band})$

b. Recall from Math 1 that two events are **mutually exclusive** if they cannot both occur on the same outcome. If you select a junior at random, are the events prefer hotel and prefers hip-hop band mutually exclusive? Explain.

No because 73 Juniors preferred a hotel and a hip-hop band.