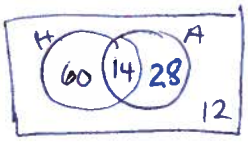
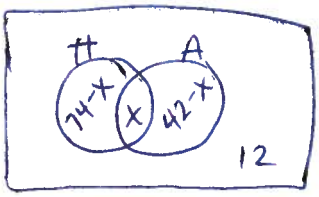
Example: Of the 114 faculty members at NAHS, 74 use an IPhone, 42 use an IPad, and 12 use neither. How many staff use and IPhone and an IPad? $x=14$

One member of the faculty is chosen at random. Find the probability that:

a. He uses an IPhone but not an IPad.
b. If he is an IPhone user he also uses an IPad
c. If he uses an IPad he does not use an IPhone.





Let H = IPhone
A = IPad
x = both

$74-x+x+42-x+12=144$
$128-x=114$
$x=14$

or
$74+42+12=128$
$128-114=14$

(a) $P(H \cap A') = \frac{60}{114} = \frac{10}{19}$

(b) $P(A|H) = \frac{14}{74} = \frac{7}{37}$

or $\frac{P(A \cap H)}{P(H)} = \frac{\frac{14}{114}}{\frac{74}{114}} = \frac{14}{74}$

(c) $P(H'|A) = \frac{28}{42} = \frac{2}{3}$ or $\frac{P(H' \cap A)}{P(A)} = \frac{28/114}{42/114} = \frac{28}{42} = \frac{2}{3}$

ASSIGNMENT EXERCISES 3G

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#1-12

Section 3.5

Probability tree diagrams

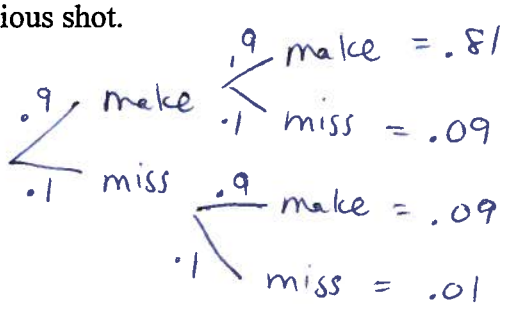
Tree diagrams are useful for problems where more than one event occurs.

- It is easier to use than to list all the possible outcomes.

- With Replacement and repeated events

Example: The probability that Yogi Ferrell makes a free throw is 0.9. He takes 2 shots. Assume that each shot is independent from the previous shot.

Represent this situation in a tree diagram.



notice Sum = 1

Find the probability that Yogi

a. Makes both free throws.
$P(\text{make} \cap \text{make}) = .9 \times .9 = .81$

b. Makes only one free throw.
$P(\text{make} \cap \text{miss}) + P(\text{miss} \cap \text{make}) = .09 + .09 = .18$

c. Misses both free throws.
$P(\text{miss} \cap \text{miss}) = .1 \times .1 = .01$

d. Makes at least one free throw.
$1 - P(\text{miss} \cap \text{miss}) =$
$1 - .01 = .99$ or part a + part b
$.81 + .18 = .99$

Without replacement

- You can also use a tree diagram when the probabilities change due to non-replacement.
- Be sure to change the probabilities in the diagram.

Sometimes tree diagrams are not in the normal shape.

Example. Let's say that you have three flashlights. There is a 70% chance that the first one you pick up works. There is a 40% chance the second one you pick up works. Finally, there is a 20% chance that the third one will work.

Represent the problem in a tree diagram.

a. What is the probability that if you have to try the second flashlight it works?

* conditional probability

$$\frac{P(\text{doesn't work}_1 \text{ \& works}_2)}{P(\text{doesn't work}_1 \text{ + works}_2) + P(\text{doesn't work}_1 \text{ + doesn't work}_2)} \rightarrow \frac{(.3)(.4)}{(.3)(.4)+(.3)(.6)} = \frac{.12}{.30} = .40$$

b. What is the probability that none of the flashlights work?

$.3 \times .6 \cdot .8 = .144$

Assignments Exercises 3H and 3I

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