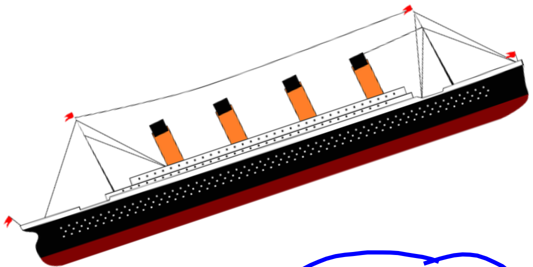
Wednesday, December 5, 2018

- Warm-up
  - Use the given two-way table about the Titanic passengers to determine the following probabilities

	Survival Status	
Class of Travel	**Survived**	**Died**
First Class	197	122
Second Class	94	167
Third Class	151	476

  - **Given that the person selected was in first class, what's the probability that he or she survived?**
  - **If the person selected survived, what's the probability that he or she was a third-class passenger?**
  - **Is survival independent of class of travel?**
- Review…

- Use the given two-way table about the Titanic passengers to determine the following probabilities $P(S) \stackrel{?}{=} P(S|T)$



	Survival Status	
Class of Travel	**Survived**	**Died**
First Class	197	122
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$P(SC|S)$ $\frac{94}{442}$ $.21$

$\frac{442}{1207} \approx 36.6\%$

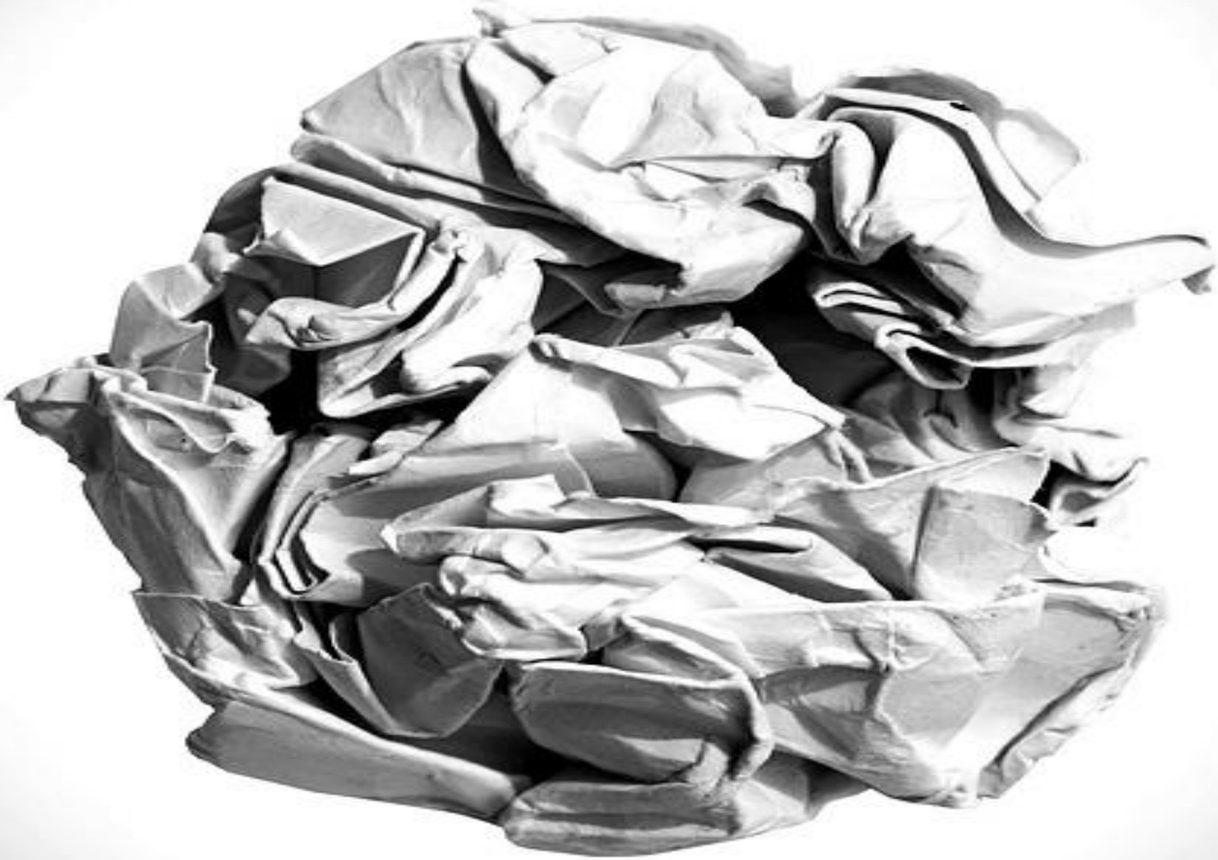
$P(S) \stackrel{?}{=} P(S|F)$ $P(T) \stackrel{?}{=} P(T|S)$

- **Given that the person selected was in first class, what's the probability that he or she survived?** $P(S|F) = \frac{197}{319} \approx 0.61$ 61%

- **If the person selected survived, what's the probability that he or she was a third-class passenger?** $P(T|S) = \frac{151}{442}$

- **Is survival independent of class of travel?**

Probability & Paper Wads



Data Collection

5'6" or above tall
< 5'6" = short

	Made shot	Missed Shot	Total
Tall	37	16	53
Short	38	21	59
Total	75	37	112

Put on board

a) What is the probability that a shot was made?

$$P(\text{shot made}) = \frac{75}{112}$$

b) What is the probability that a shot was taken by a tall person?

$$P(\text{tall}) = \frac{53}{112}$$

c) What is the probability a shot was made and the shooter was a tall person?

P(shot made and tall) = $\frac{37}{112}$

d) What is the probability a shot was made or the shooter was a tall person?

$P(SM) + P(Tall) - P(SM \cap Tall)$

P(shot made or tall person) = $\frac{75}{112} + \frac{53}{112} - \frac{37}{112}$

$\frac{91}{112}$

e) Given that a shot was made, what is the probability the shooter was a short?

0.52

$$\frac{59}{112} \stackrel{?}{=} \frac{38}{75} \leftarrow 0.50$$

P(short | ~~shot made~~) = $\frac{38}{75}$

0.669 0.644

$$\frac{75}{112} \stackrel{?}{=} \frac{38}{59}$$

P(Short) $\stackrel{?}{=}$ P(short | made)

P(made) $\stackrel{?}{=}$ P(made | short)

f) Are making the shot and being short independent? Justify your answer.

Test for independence: P(A) P(A | B)

g) Assuming the probabilities above remain true for future shots, what is the probability two shots in a row both land in the wastebasket?

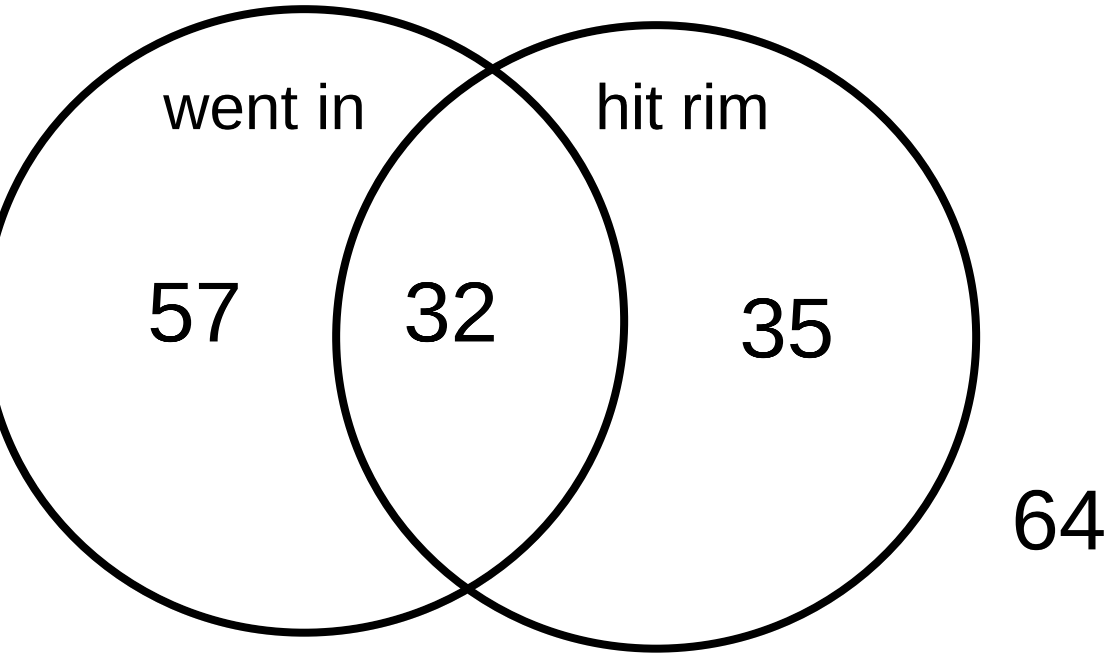
P(2 shots made) =

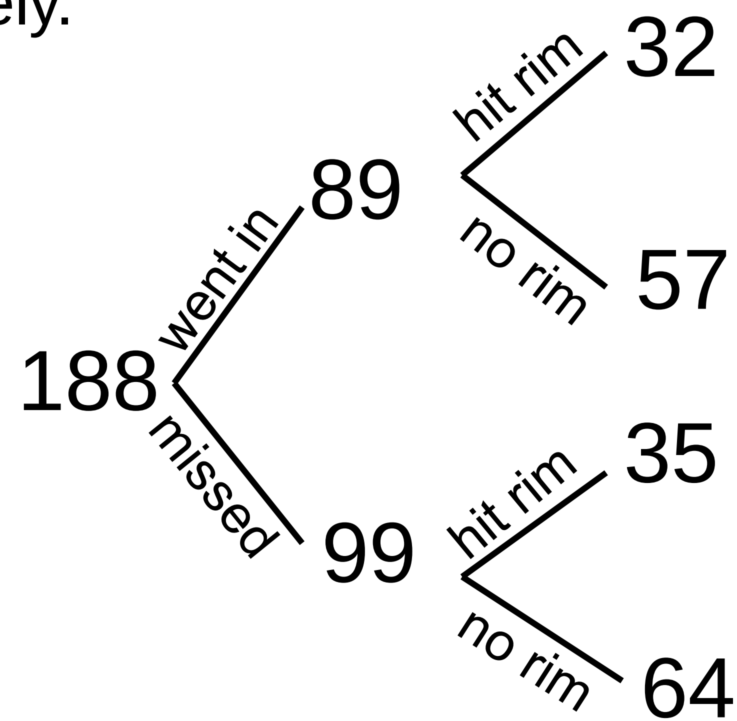
Example 1: Four friends cleaning out their math folders were too lazy to get up and throw the papers in the trash. Instead, they sat at their desks and took shots at the wastebasket. Together they took a total of 188 shots. Only 89 of the shots actually made it in the wastebasket, and of those that went in 32 of them hit the rim before going in. Sixty-four shots missed the rim and the wastebasket completely.

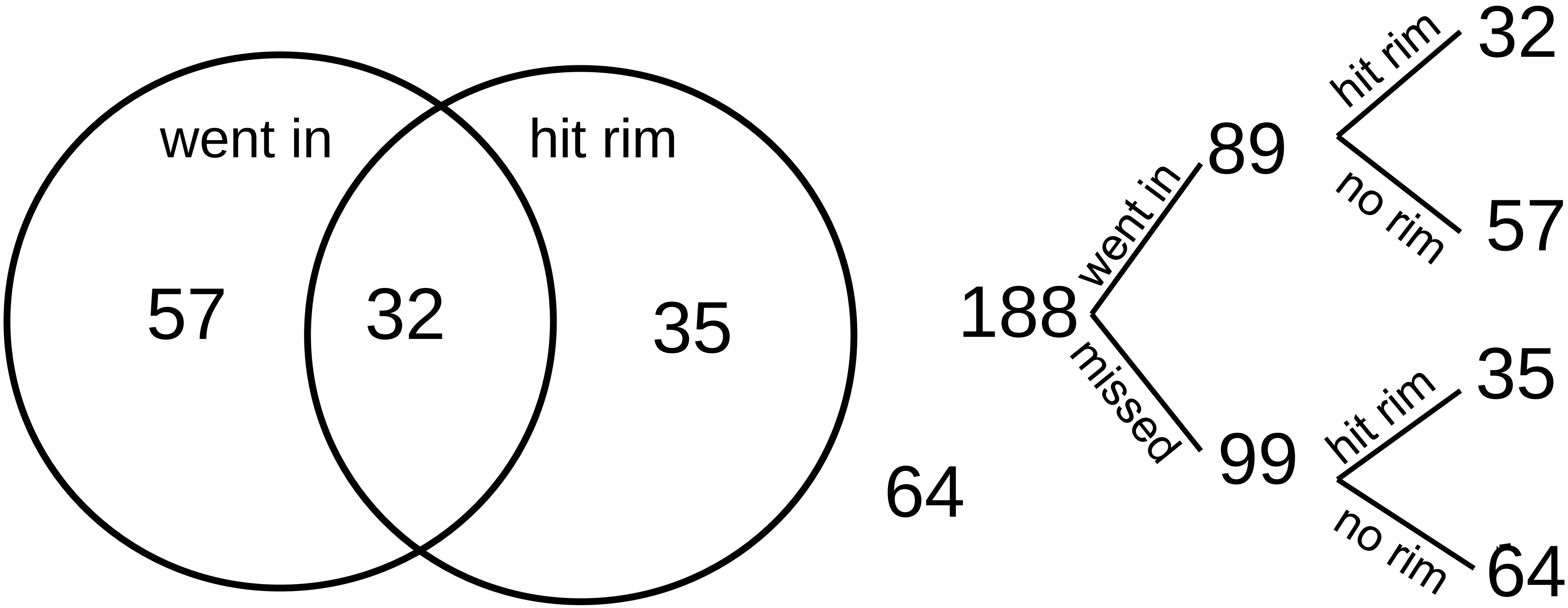
a) How many shots hit the rim but did not go in the wastebasket?

How would you solve this? Give it a try.

Example 1: Four friends cleaning out their math folders were too lazy to get up and throw the papers in the trash. Instead, they sat at their desks and took shots at the wastebasket. Together they took a total of 188 shots. Only 89 of the shots actually made it in the wastebasket, and of those that went in 32 of them hit the rim before going in. Sixty-four shots missed the rim and the wastebasket completely.

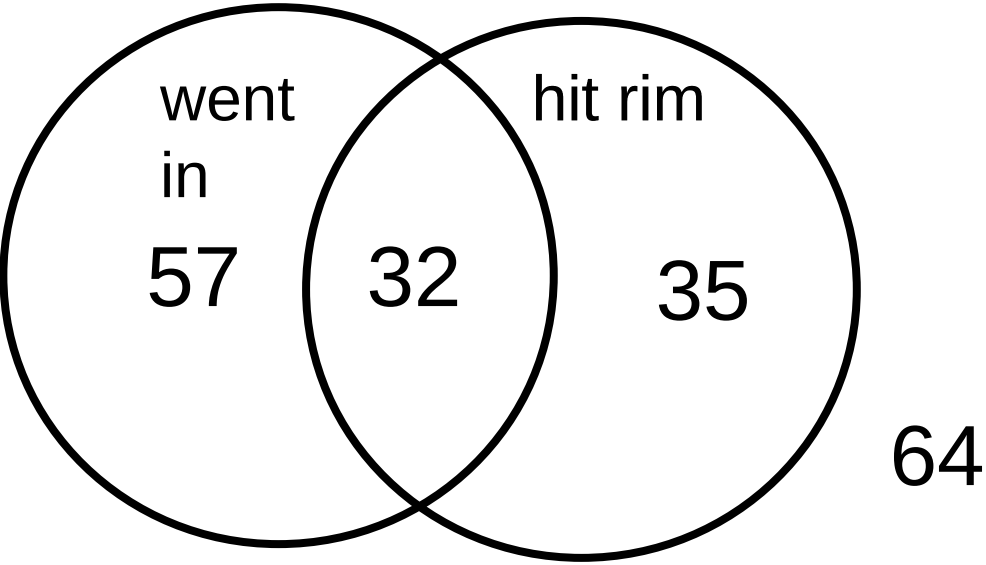


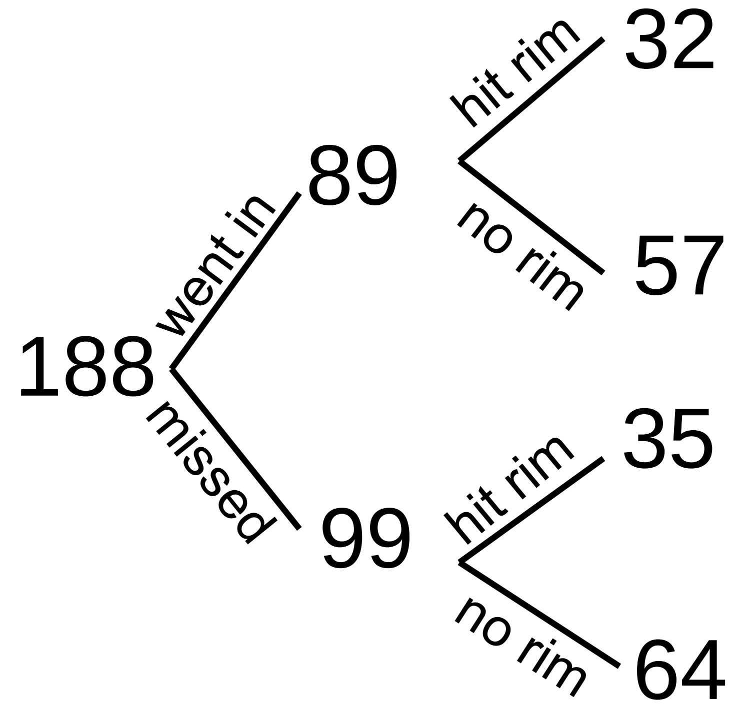




a) How many shots hit the rim but did not go in the wastebasket?

35

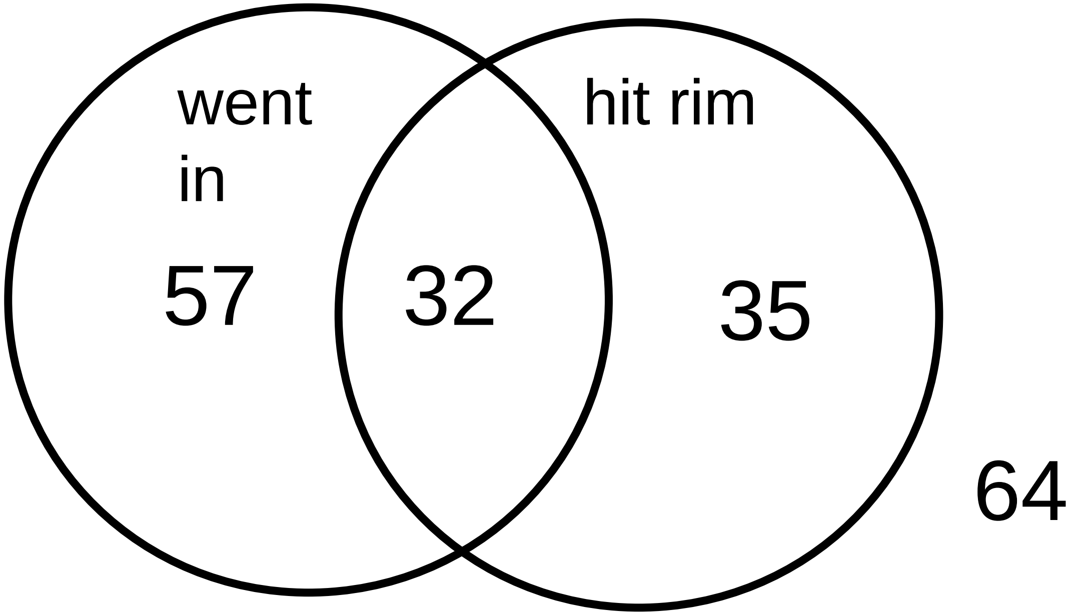


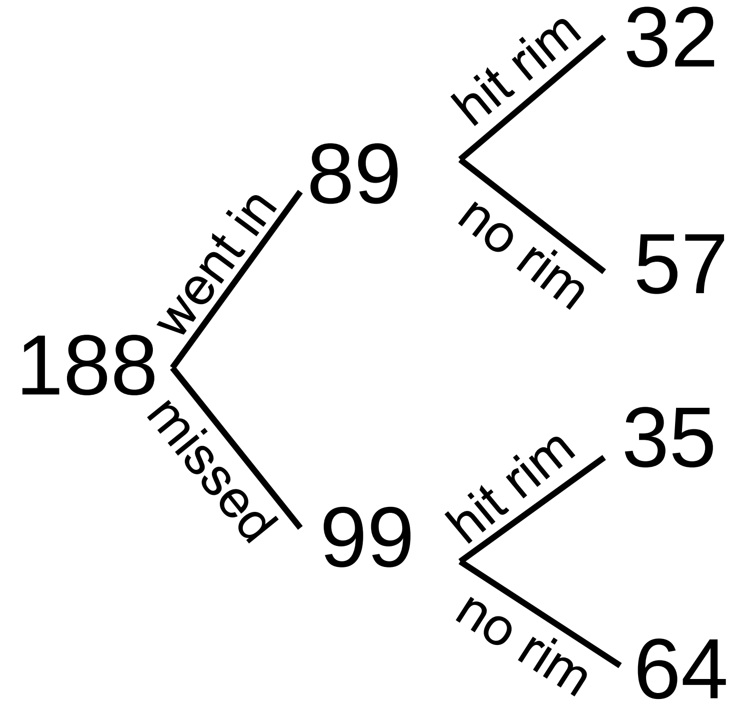


b) What is the probability a shot hit the rim but did not go in the wastebasket?

P(shot hit the rim and did not go in) =

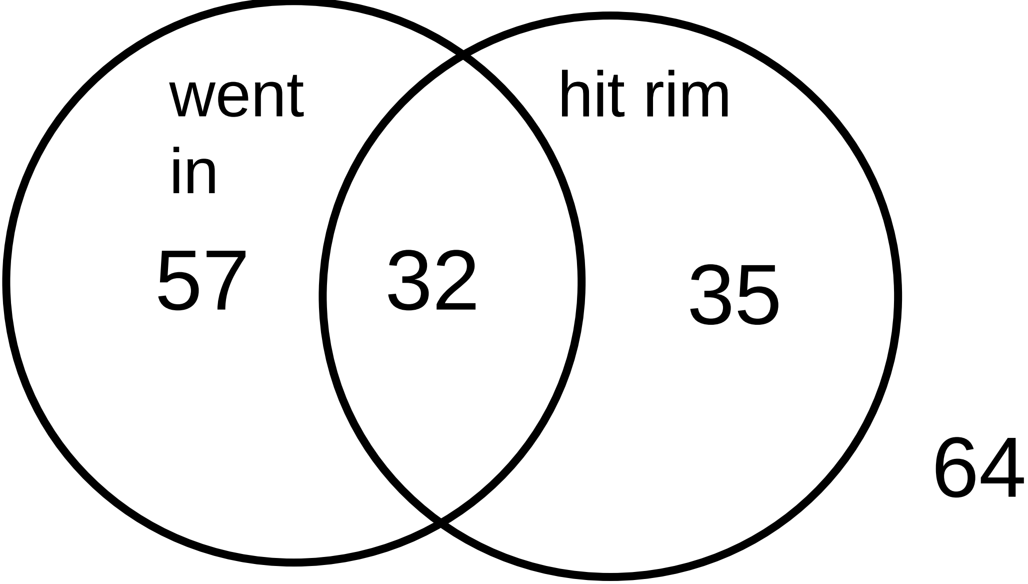
35/188 = .186

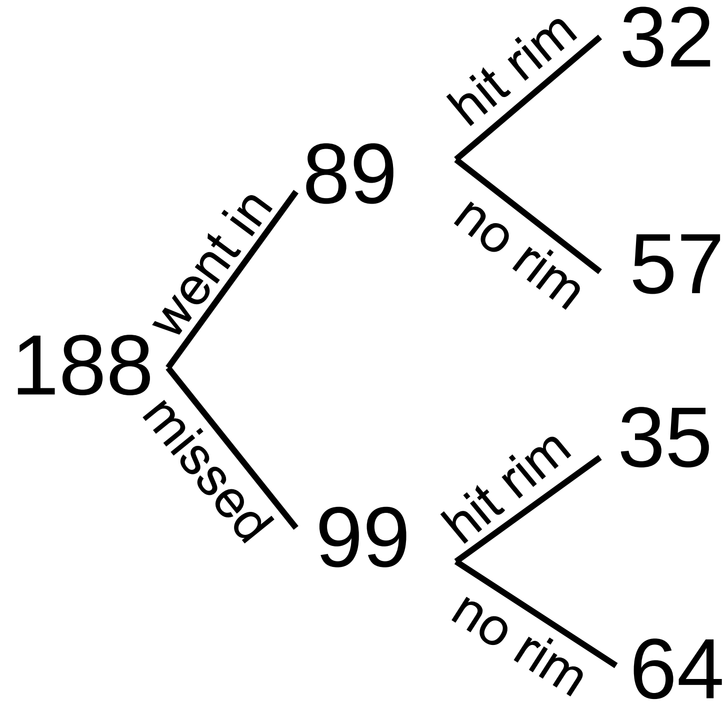




c) What is the probability a shot went in the basket?

P(shot made) = 89/188 = .473





d) What is the probability a shot went in if the shot hit the rim?

P(shot made | hit rim) = 32/67 = .478

Example 2: The probability Michael makes a shot from his desk into the wastebasket is 0.6.

a) What is the probability Michael shoots and misses?

P(Michael misses the shot) =

b) What is the probability Michael makes 3 shots in a row?

P(Michael makes 3 shots in a row) =

c) What is the probability Michael misses his first three shots and makes his forth shot?

P(no basket until the forth shot) =

Review…

Example 3: A group of students was recently polled about the technology they own.

69 own a cell phone

45 own a computer

23 own an ipod

4 do not own any of the above three items

34 own a cell phone but not a computer nor an ipod

6 own all three, a computer, an ipod, and a cell phone

8 own a cell phone and an ipod but not a computer

2 own only an ipod

Try this one.

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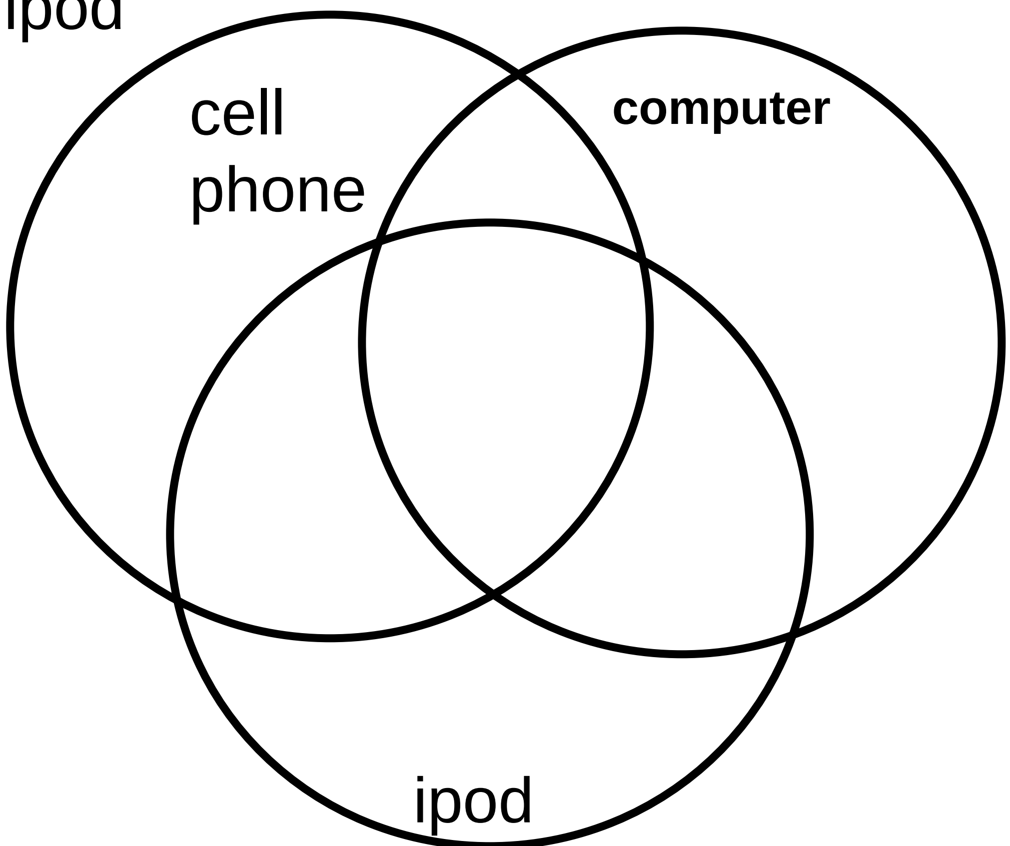

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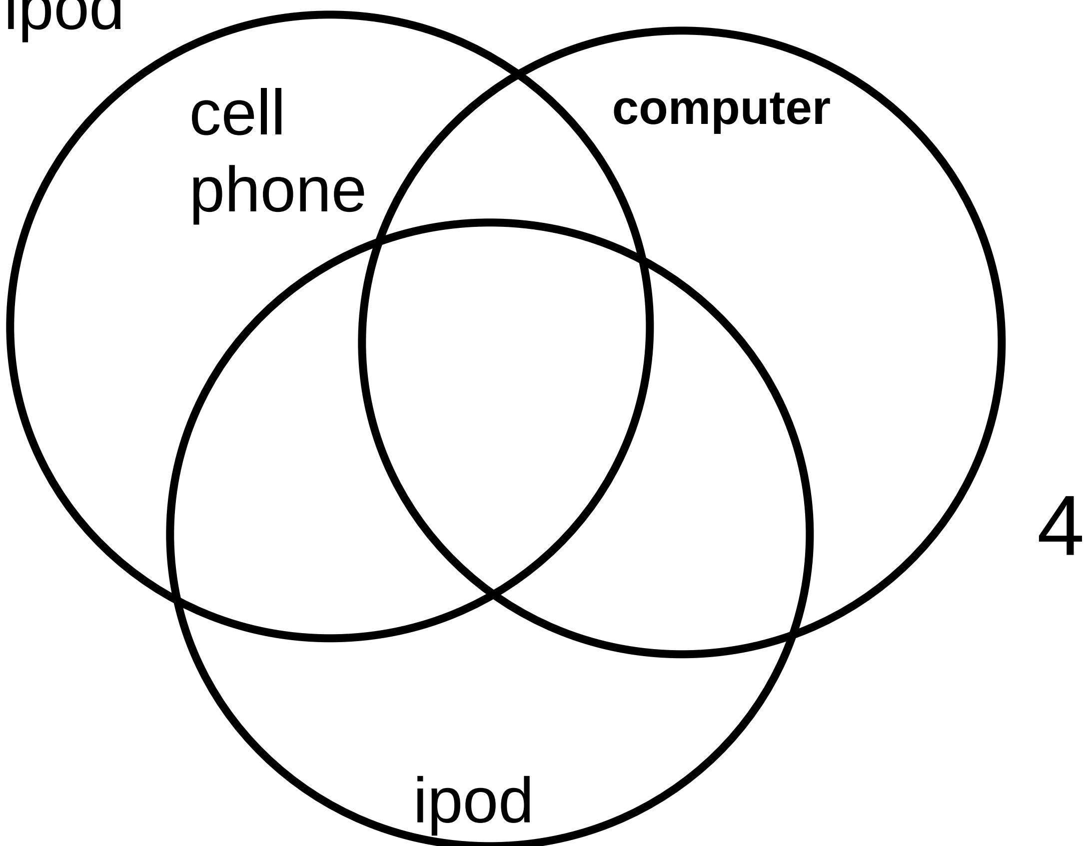

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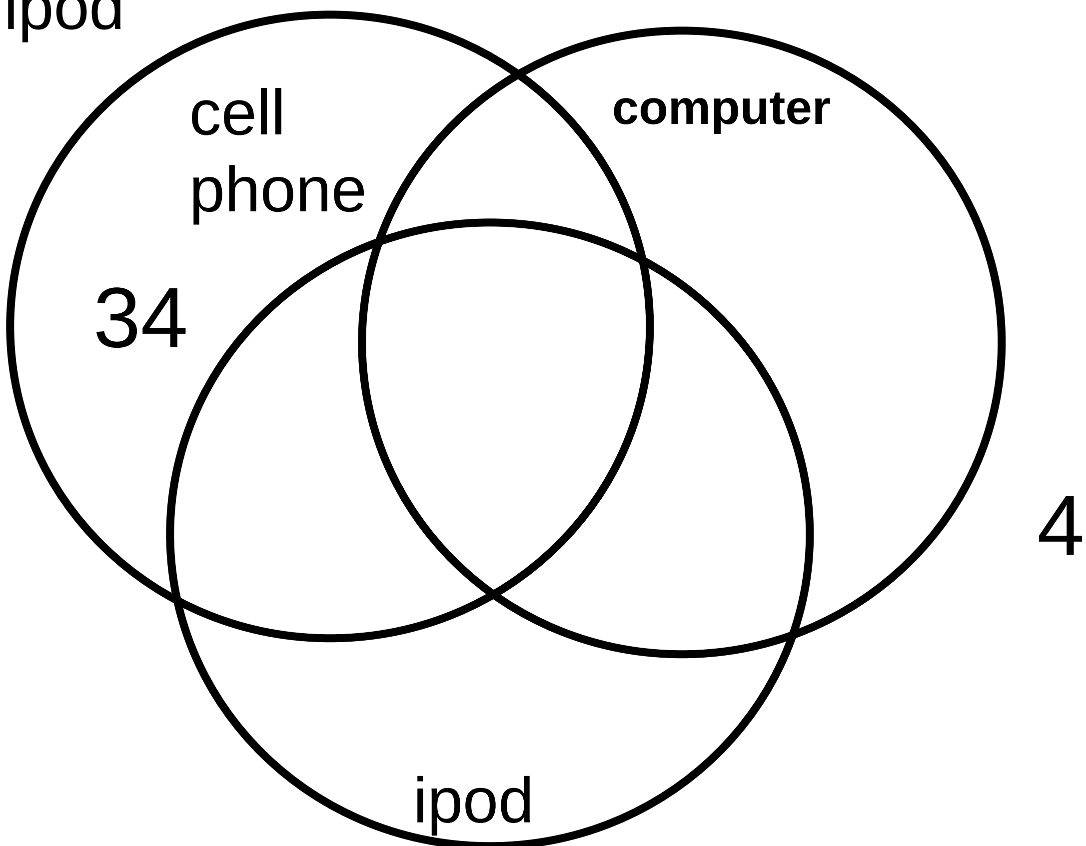

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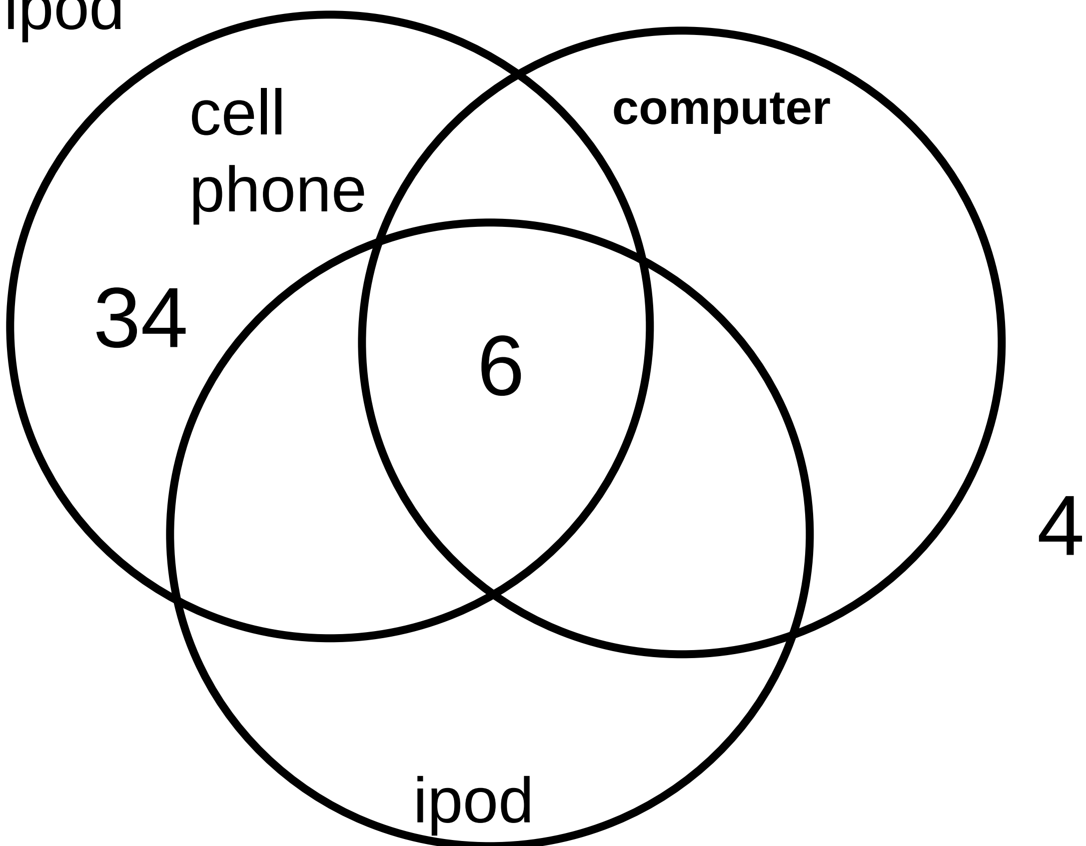

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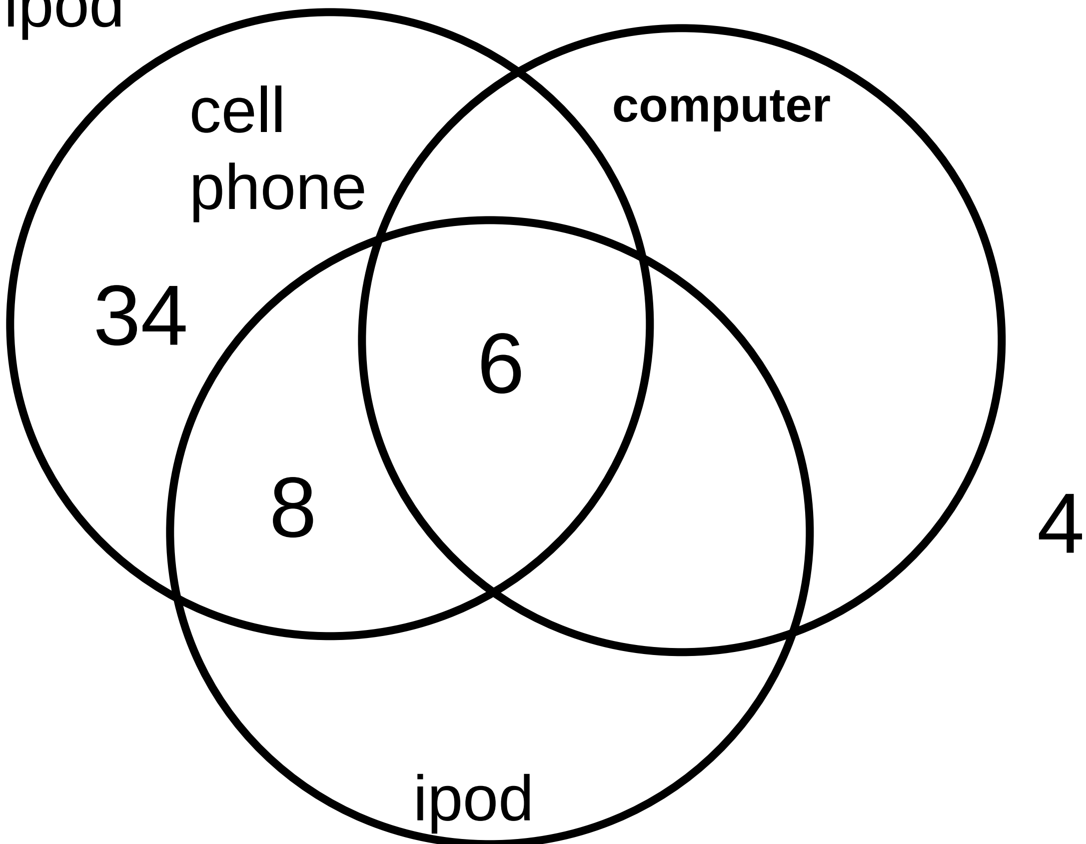

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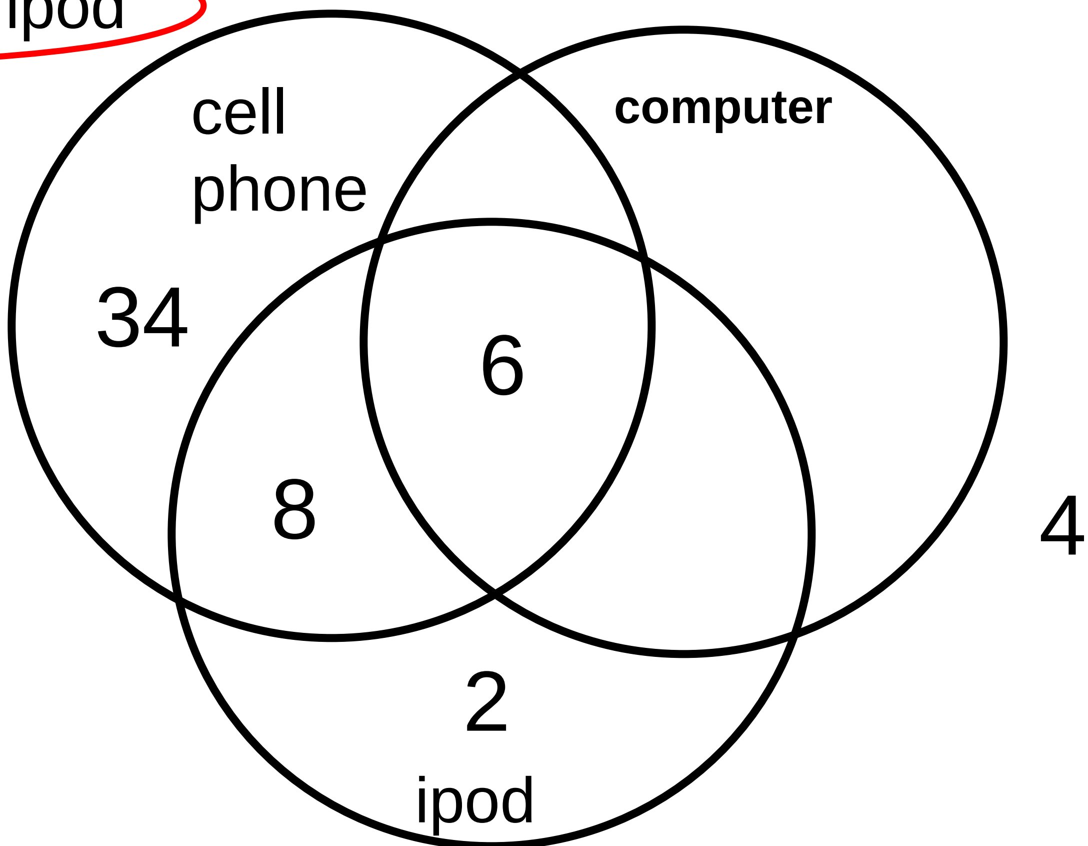

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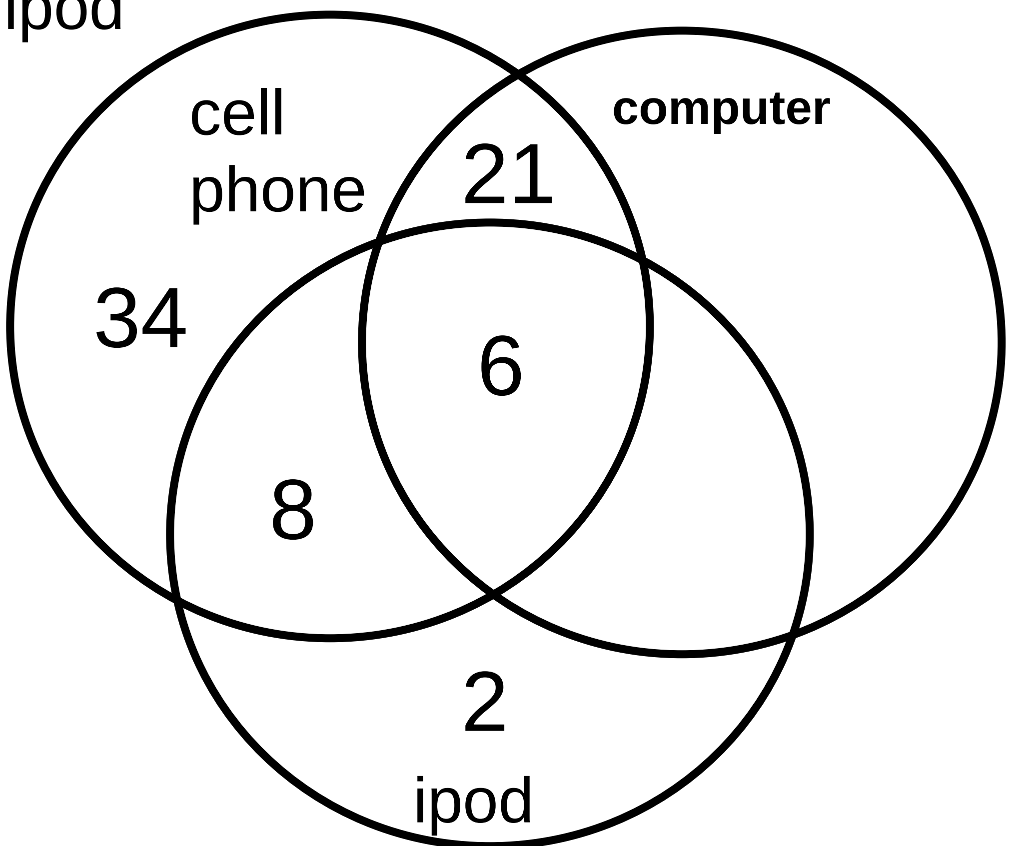

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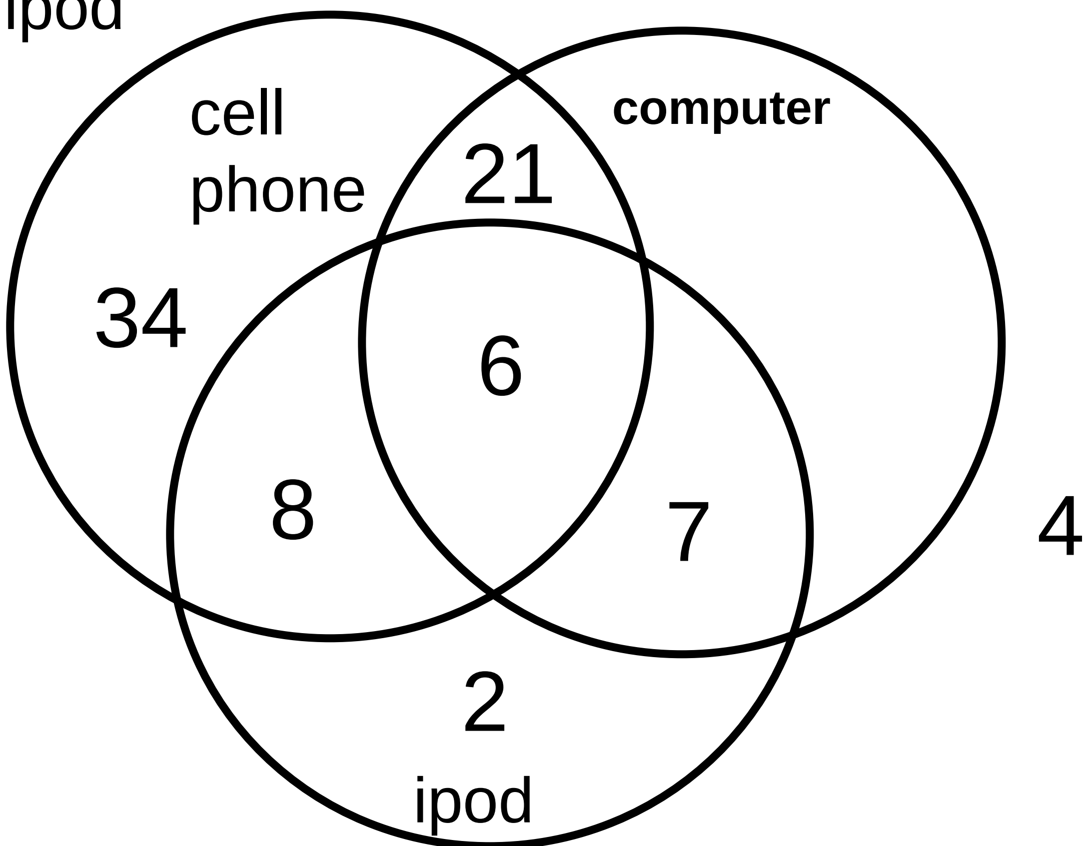

69 own a cell phone

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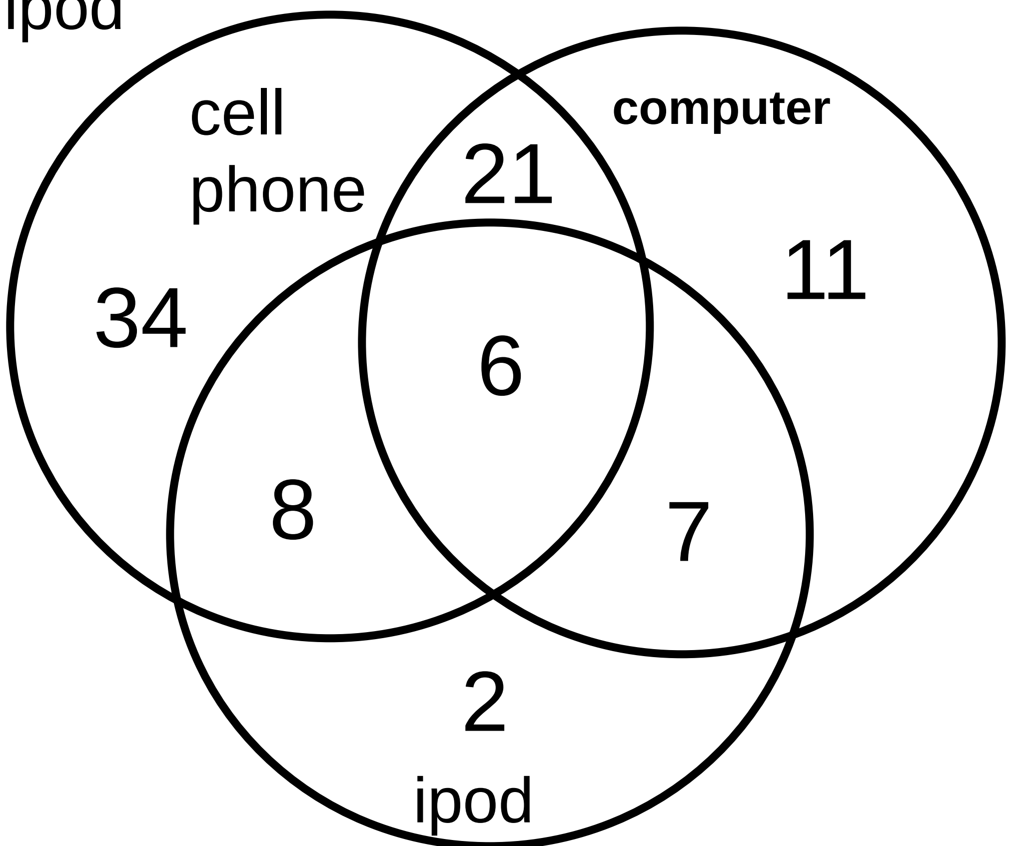
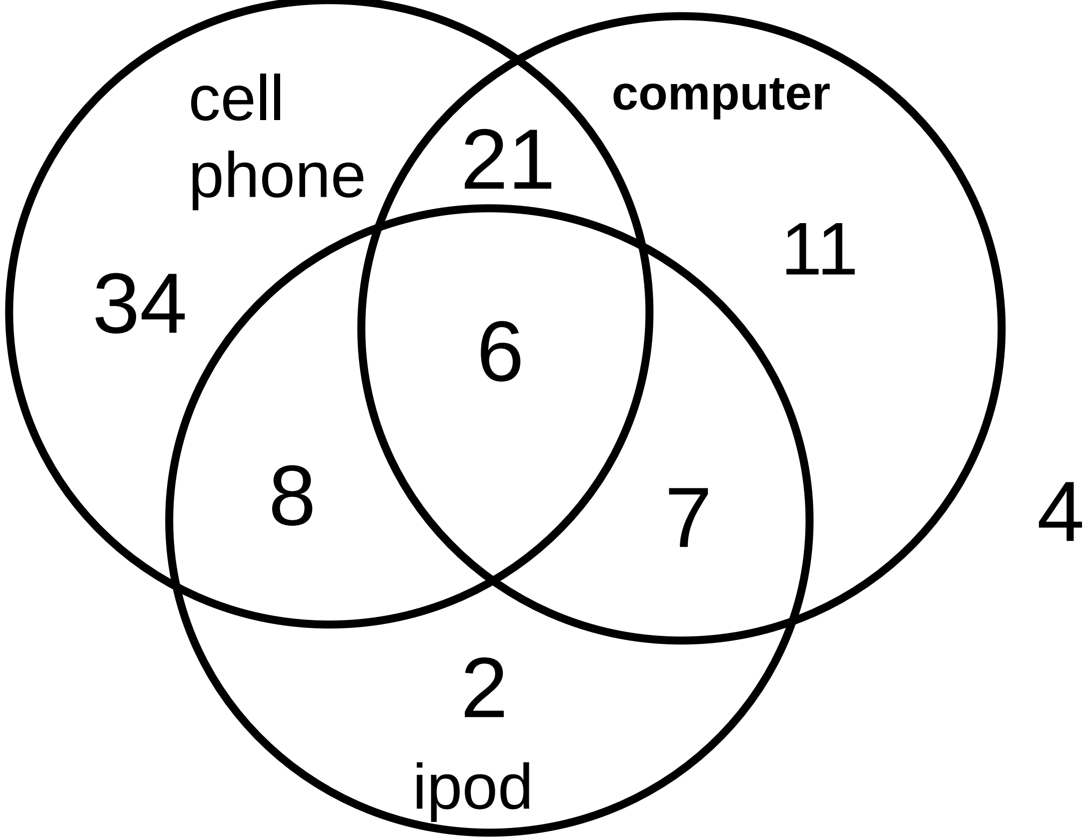
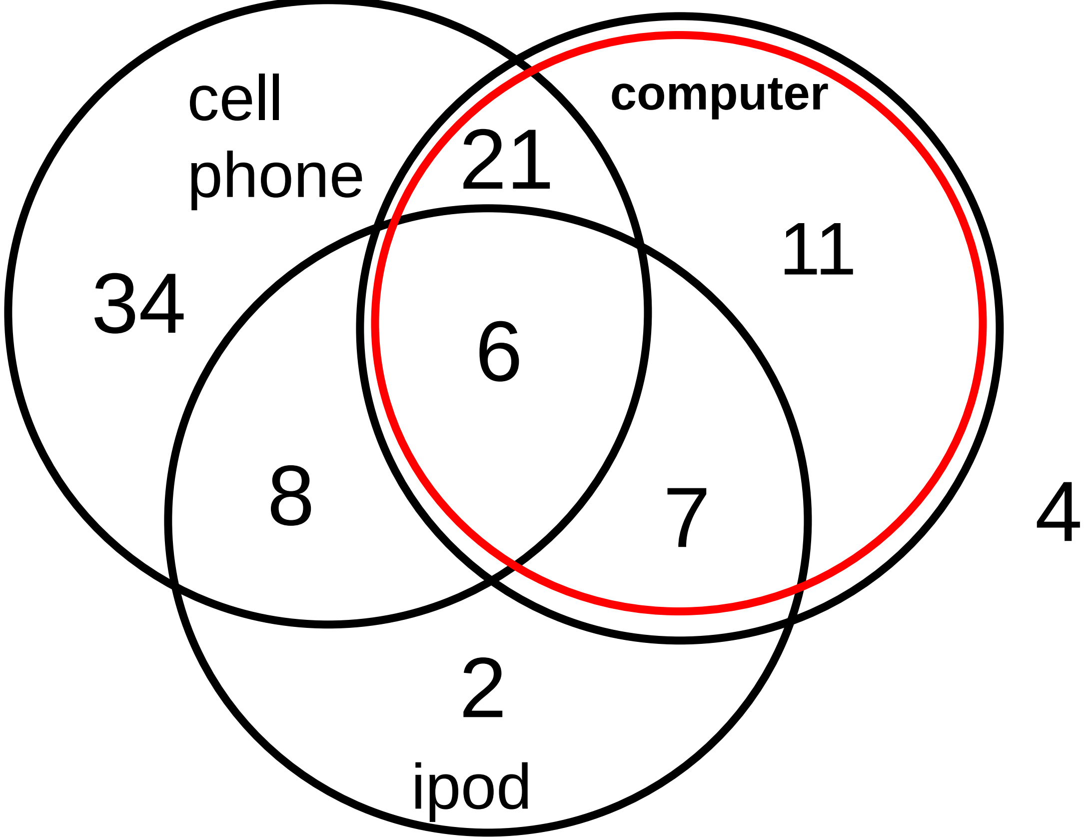


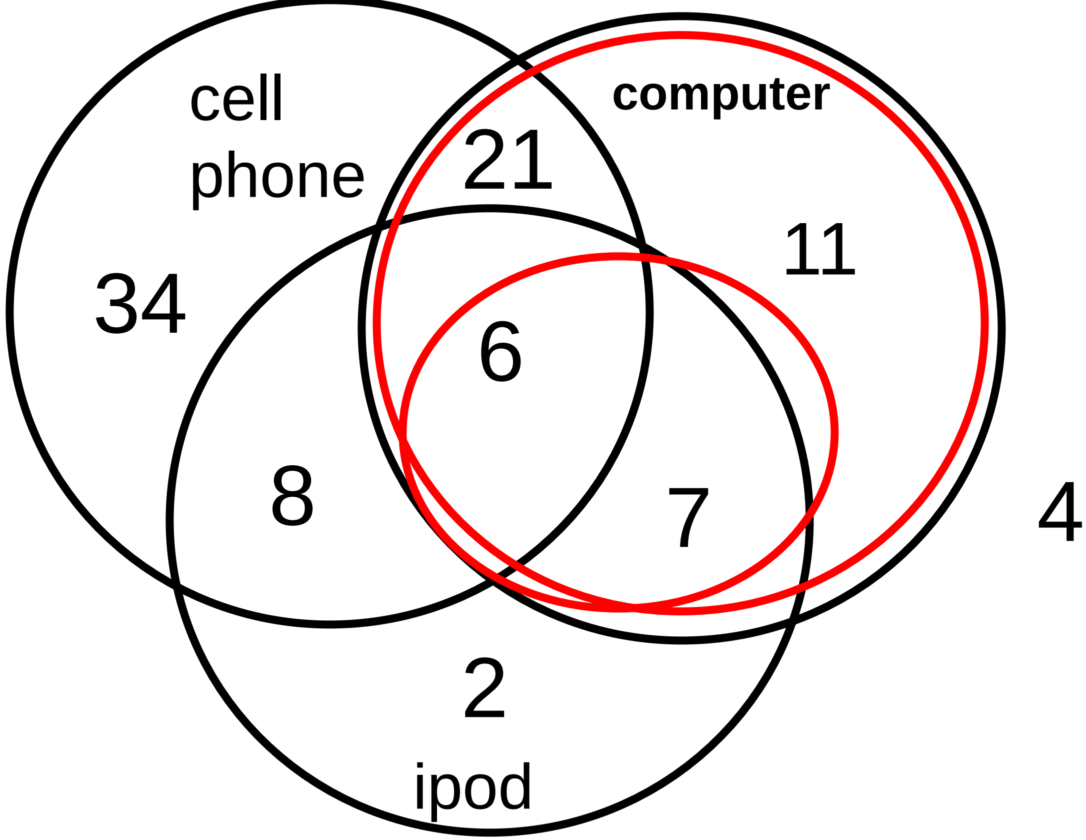


a) How many students were polled? 93



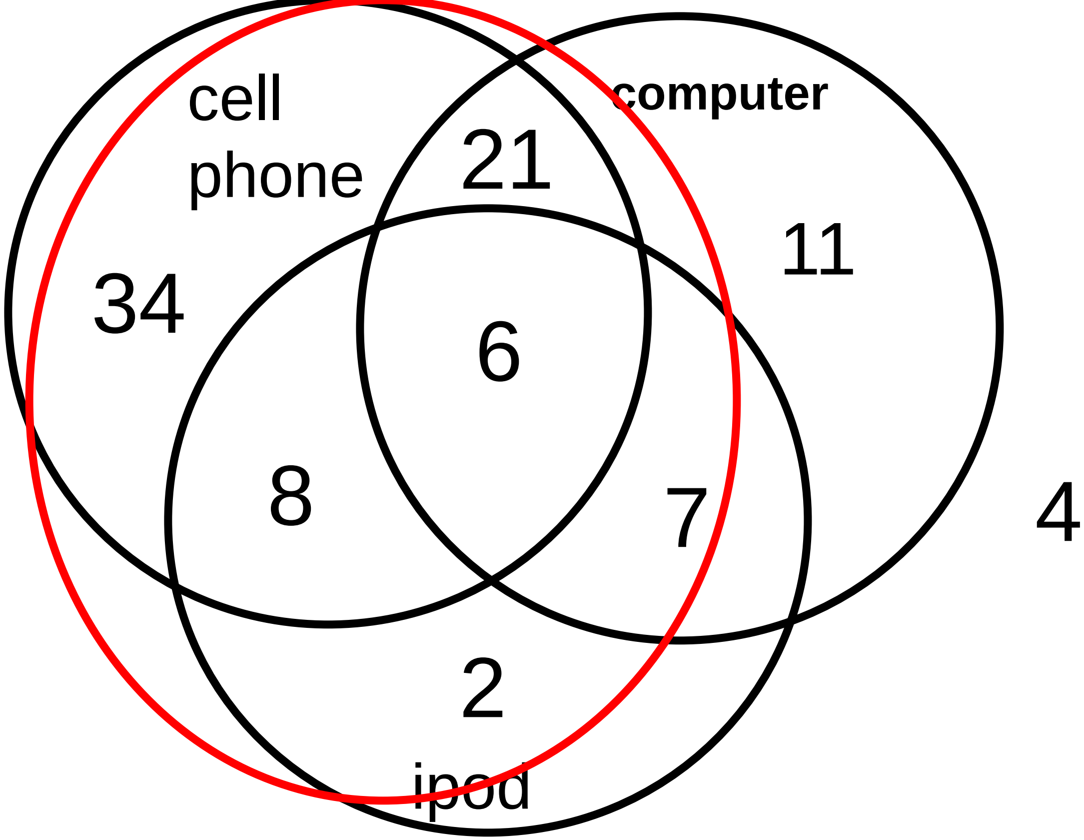
b) What is the probability a randomly selected polled student owns a computer?

P(computer) = 45/93 = .484



c) What is the probability a computer owner also owns an ipod?

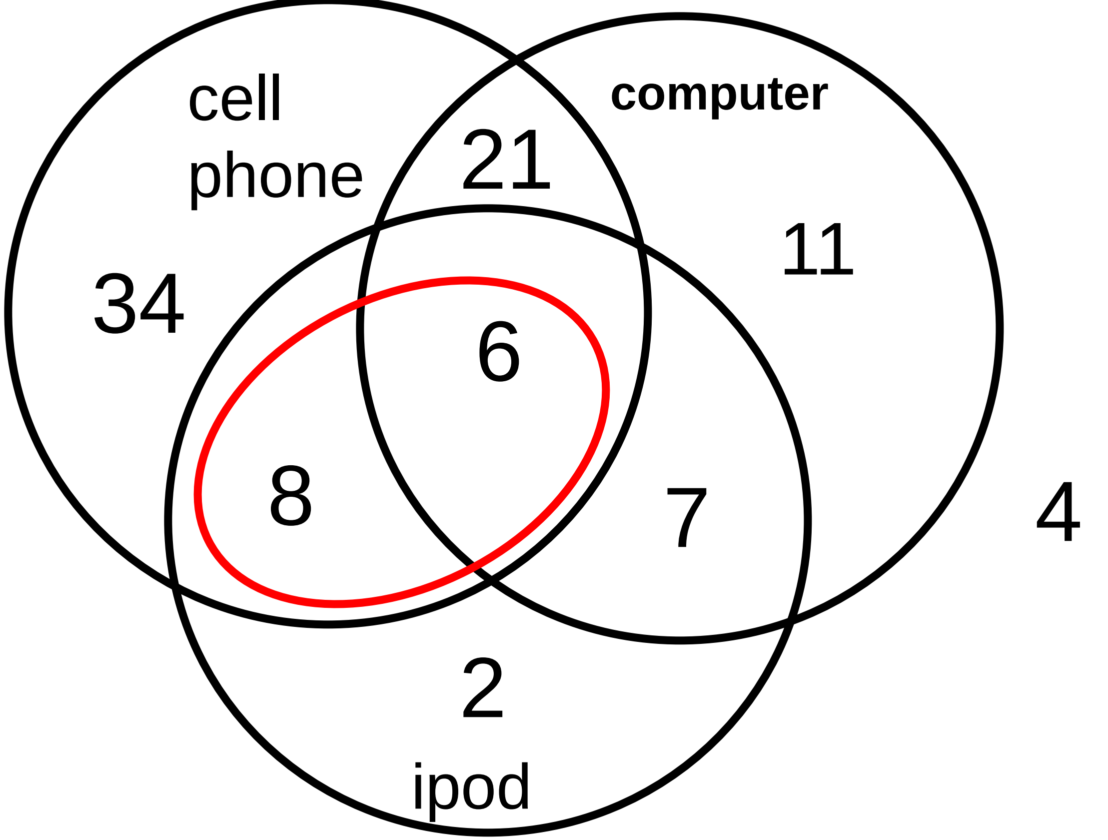
P(ipod | computer) = 13/45 = .289



d) What is the probability a randomly selected polled student owns an ipod or a cell phone?

P(ipod or cell phone) = 78/93 = .839

or you could go 93 – 15 to get 78



e) What is the probability a randomly selected polled student owns an ipod and a cell phone?

P(ipod and cell phone) = 14/93 = .151

Example 4: this one requires using systems of equations

There are 500 seniors.
210 are enrolled in computers
80 do not need any of the 3
80 are taking only fine arts.
180 are taking fine arts.
36 taking only economics and computers
10 taking only fine arts and computers
220 taking economics

There are 500 seniors.

210 are enrolled in computers

80 are taking only fine arts

220 taking economics

180 are taking fine arts

80 do not need any of the 3

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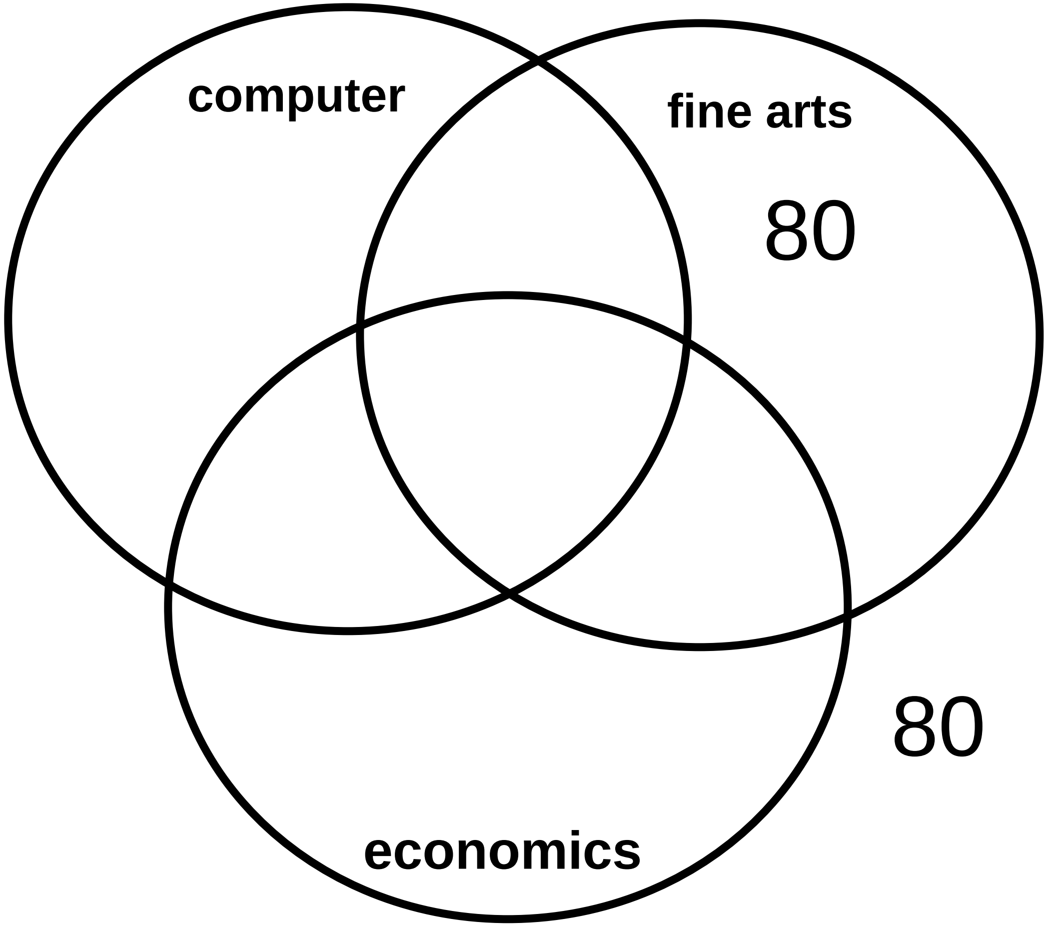
10 taking only fine arts and computers



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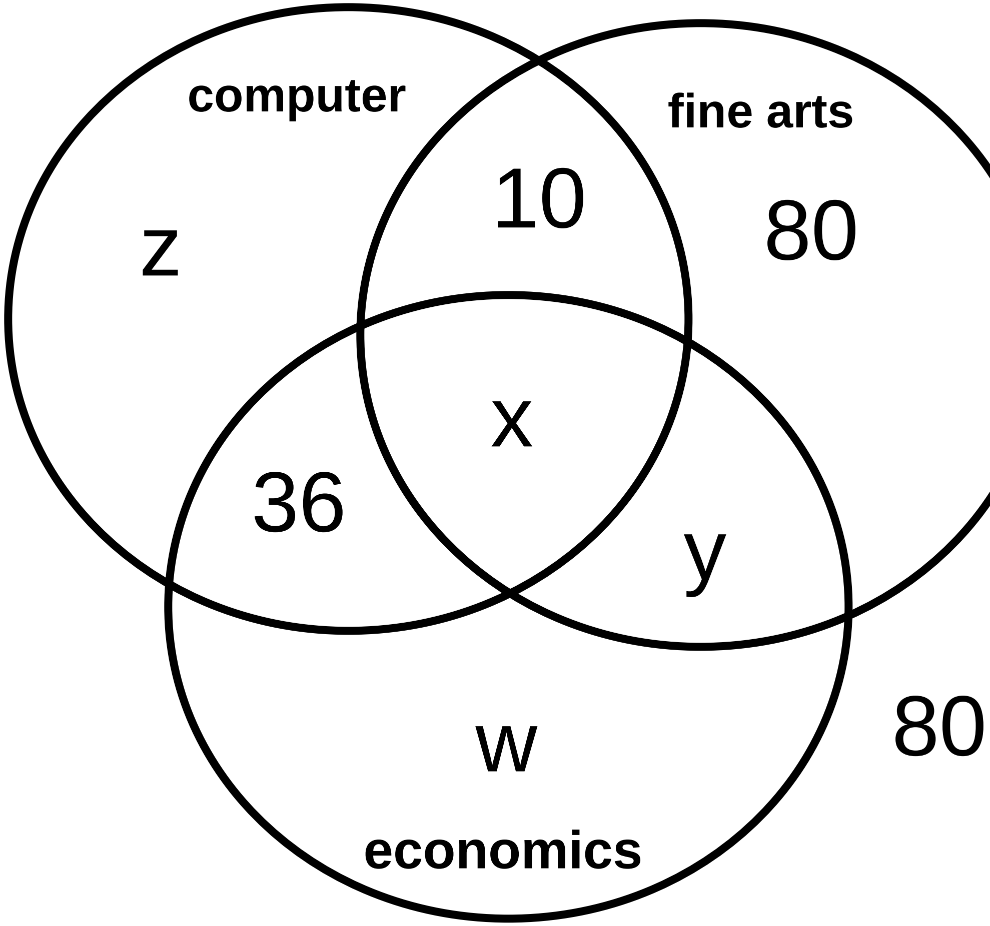

now what?

we use variables for the unknowns

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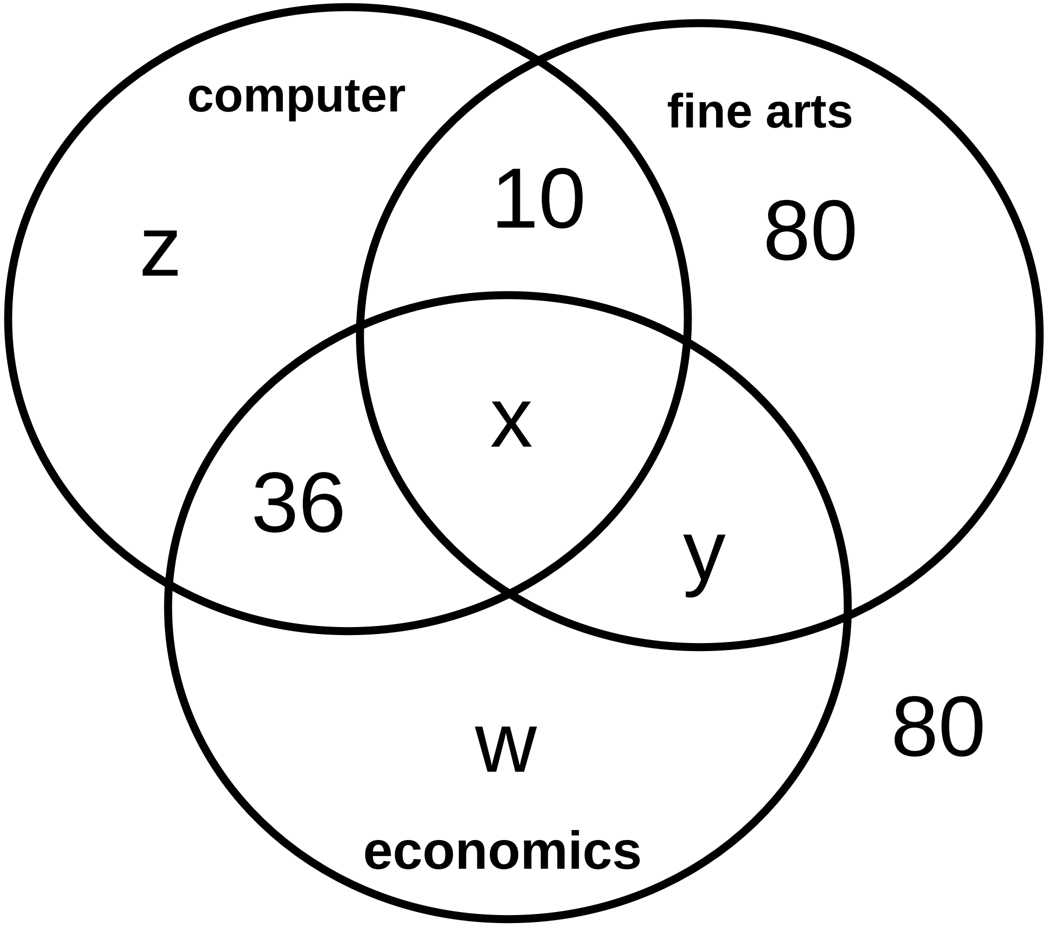

What equations can you write?

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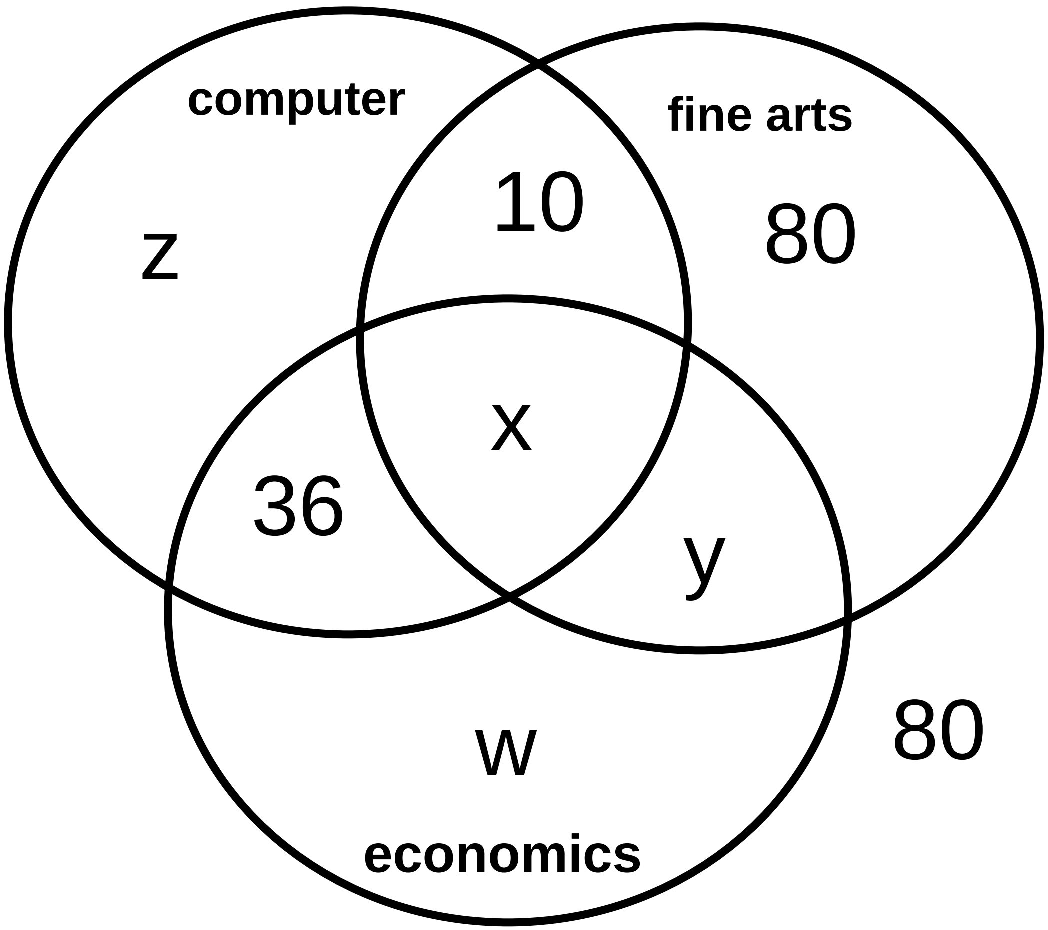

$$x + y + 10 + 80 = 180$$

$$w + x + y + 36 = 220$$

$$x + y + z + 300 = 500$$

$w = 94$ $y = 36$

$x = 54$ $z = 110$

There are 500 seniors.

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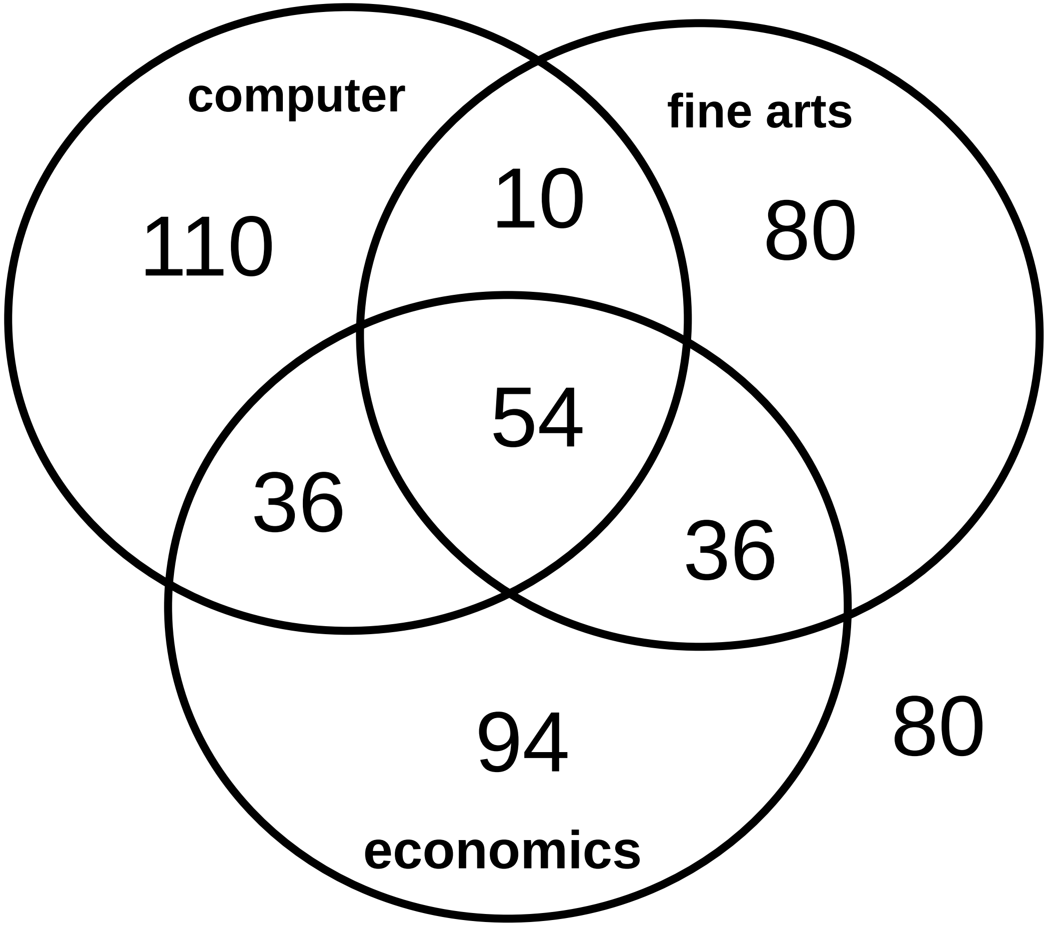

w = 94   y = 36

x = 54   z = 110

a).188

b) .18

c) .108

Homework

- **Turn in ALL work from the chapter:**
  - **Notes from Chapter 14**
  - **P 339 (17-24)**
  - **P 361 (2-6)**
  - **P 361 (9, 10, 15-20)**
  - **P 340 (33-36)**
  - **P 364 (41-44)**

- **AND Article**