

# Math 2311

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Office Hours: MW 11am to 12:45pm in 639 PGH

Online Thursdays 4-5:30pm

And by appointment

Class webpage: <http://www.math.uh.edu/~bekki/Math2311.html>

## 2.1 Counting

- multiply choices
- order matters - permutation
- order doesn't matter  
- combinations

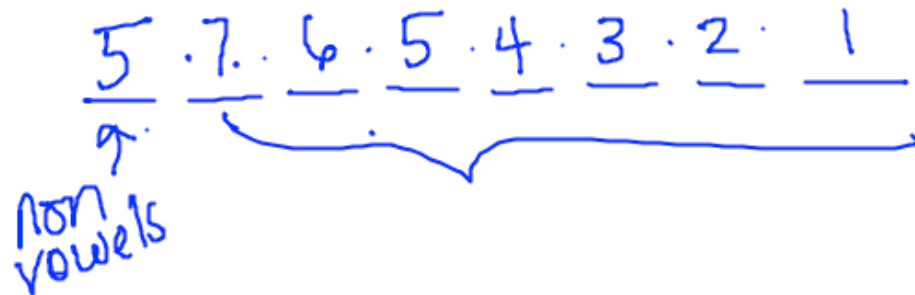
$${}^n P_r = \frac{n!}{(n-r)!}$$

# choosing from  $n$       how many  $r$

$${}^n C_r \text{ or } \text{choose}(n, r)$$

ex # 21

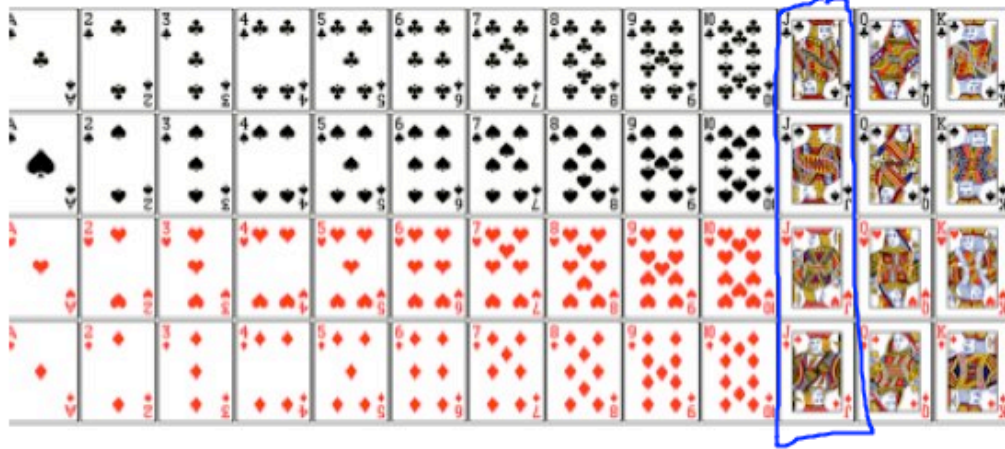
21. How many ways can the letters of the word COMPUTER be arranged if the first letter cannot be a vowel?



(15-17)


There are 52 colored balls in a large tumbler, 13 red, 13 blue, 13 yellow, and 13 green. The balls of each color are lettered A through M. Five balls are chosen at random.

} like a deck of cards



5 card hands?  $52 C_5$  choose(52,5)

```
> choose(52,5)
[1] 2598960
> |
```


4 Queens? 

$4 C_4 = 1 \cdot 48 = 48$

4 Queens OR 4 Kings?  $2 (4 C_4) \cdot 48 = 96$

Any 4 of a kind?  $13 (4 C_4) \cdot 48 = 624$

Full house? 3 of a kind + 2 of another kind


$$13 (4C_3) \cdot 12 (4C_2) = 3744$$

↑  
A, 2, 3, ... K

↑  
any other suit than

↑

# Quiz

## Question 14

Given a data set consisting of 33 unique whole number observations, its five-number summary is:

[12, 24, 38, 51, 64]

How many observations are less than 38?

min Q1 Q2 Q3 max

↑  
median  
50%  
are less  
than this

a)  15

b)  17

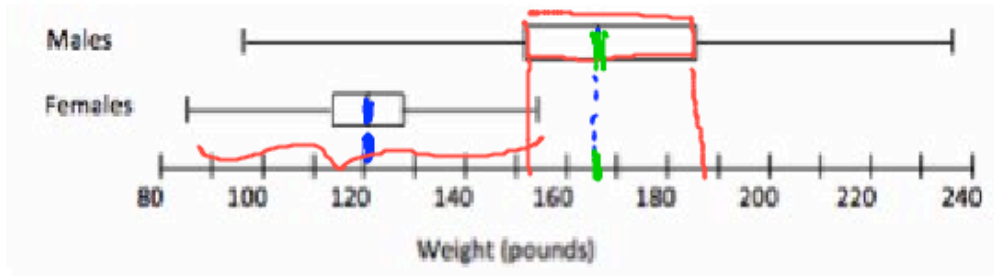
c)  37

d)  16

38

Question 13

The weights of male and female students in a class are summarized in the following boxplots:



Which of the following is NOT correct?

a)  The male students have less variability than the female students.

*males are more spread out  
→ greater variability*

b)  About 50% of the male students have weights between 150 and 185 lbs.

c)  The mean weight of the female students is about 120 because of symmetry.

*✓ when symmetric mean = median*

d)  The median weight of the male students is about 166 lbs.

1.2

For problems 5 and 6, explain why the conclusion drawn is not valid and give an example of why it is not valid.

5. A businesswoman calculates that the median cost of the five business trips that she took in a month is \$600 and concludes that the total cost must have been \$3000.
6. A company executive concludes that an accountant must have made a mistake because she prepared a report stating that 90% of the company's employees earn less than the mean salary.
7. The test scores of a class of 30 students have a mean of 75.6 and the test scores of another class of 24 students have a mean of 68.4. Find the mean of the combined group.

5, error is this should be mean so that  $5(600) = 3000$

example why wrong: 100 200 600 650 660

total \$2310  $\neq$  \$3000

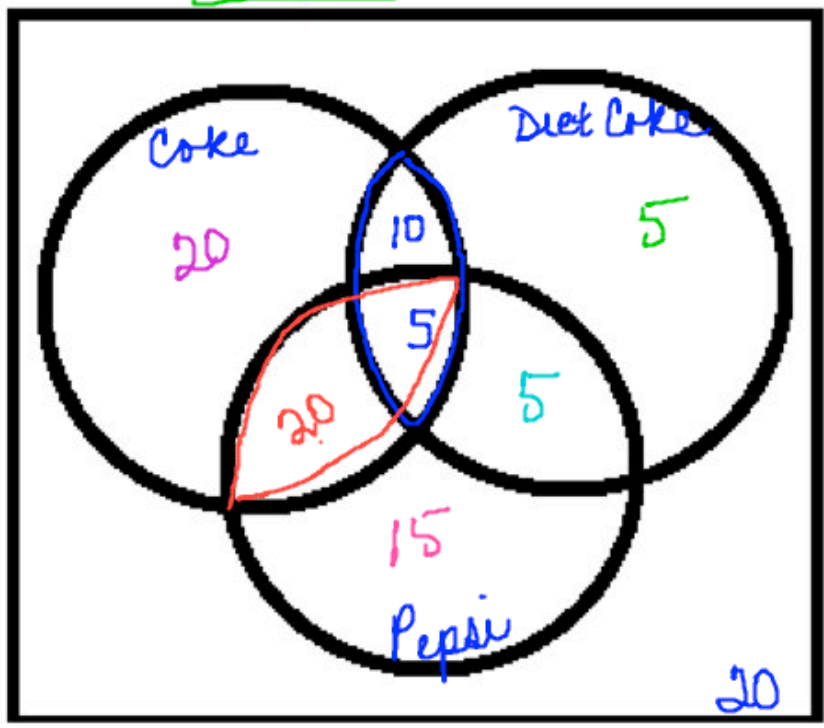
\*6. executive is wrong - you can have 90% below mean  
(if median then 50%)

ex 100 employees make \$40K & 1 person makes \$1,000,000  
mean  $\approx$  \$49,000

7  
Public Page 6  $\left( \frac{30(75.6) + 24(68.4)}{54} \right)$

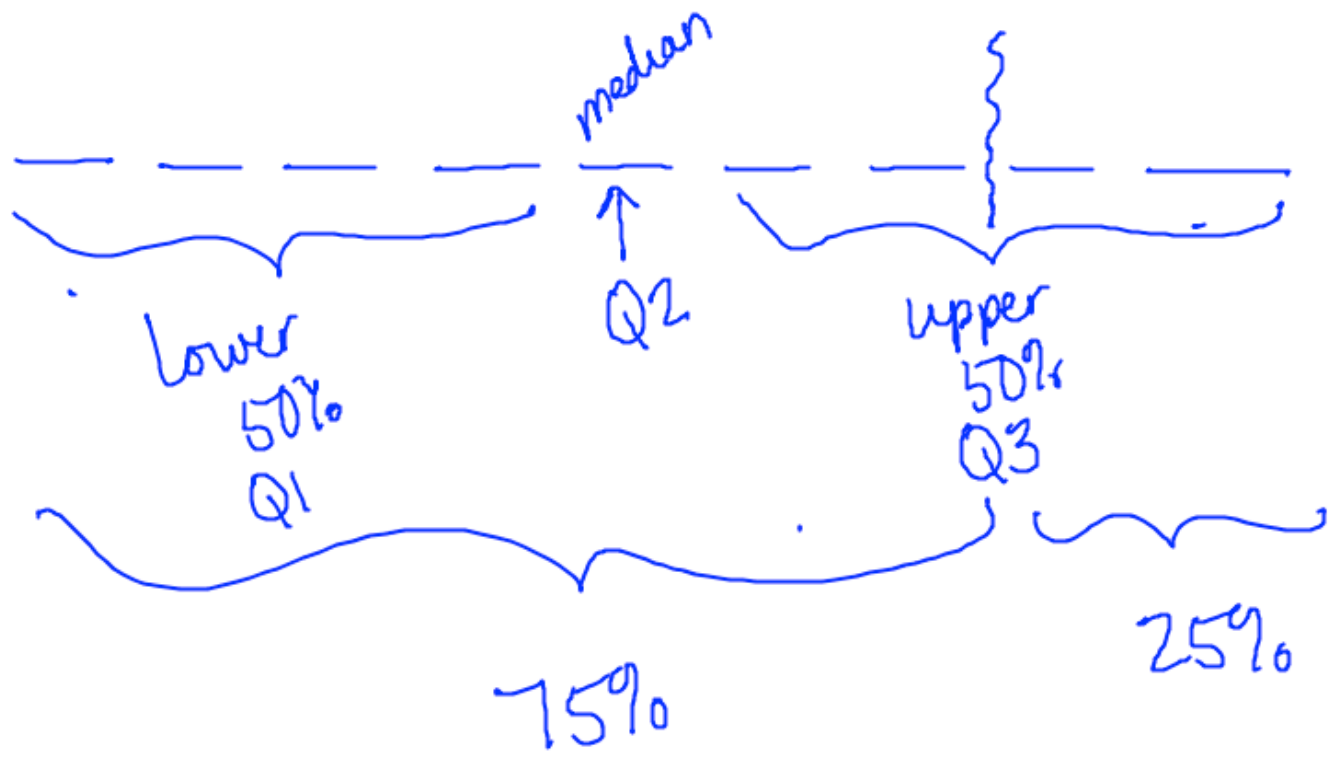
Draw a Venn Diagram for the following situation: A group of 100 people are asked about their preference for soft drinks. The results are as follows:

- 55 Like Coke
- 25 Like Diet Coke
- 45 Like Pepsi
- 15 like Coke and Diet Coke ✓
- 5 Like all 3 soft drinks ✓
- 25 Like Coke and Pepsi ✓
- 5 Only like Diet Coke ✓





median of upper 50%

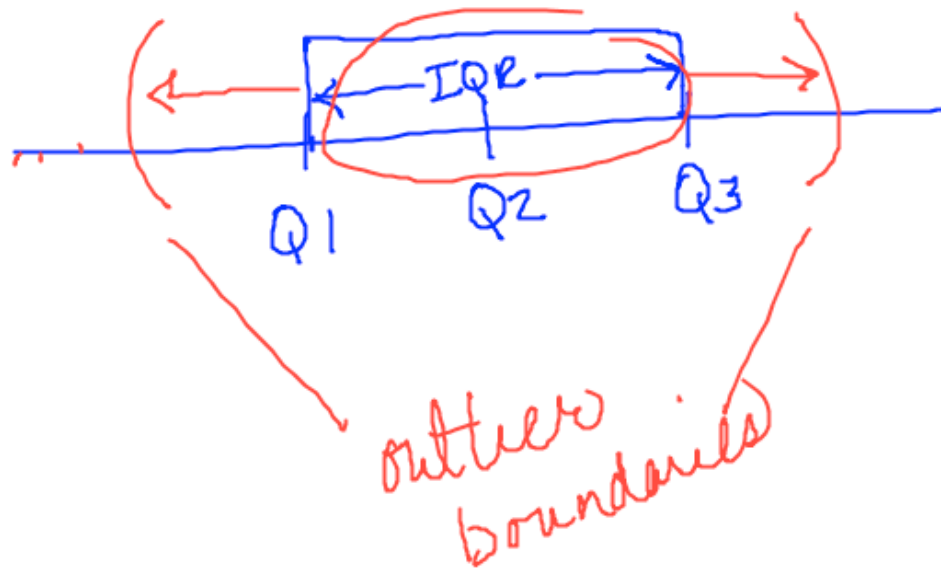


IQR - inter quartile range  
range of middle 50% of data  
resistant to outliers

$$Q3 - Q1$$

to find outliers

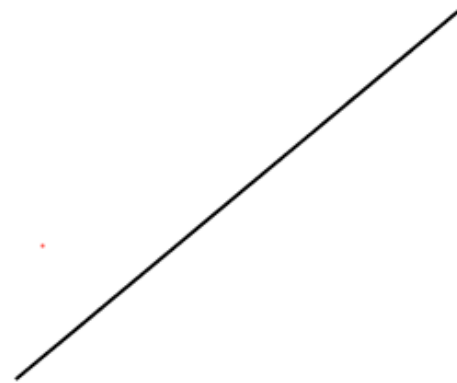
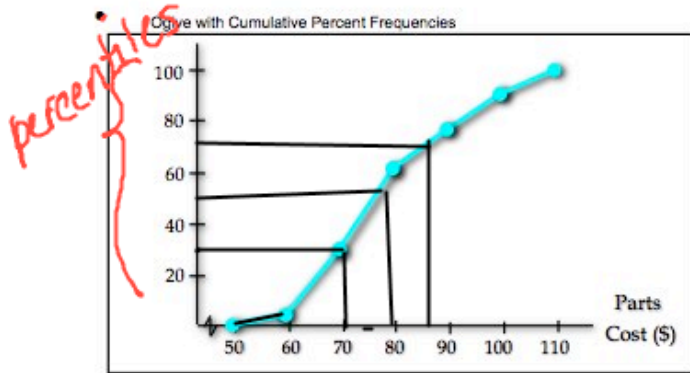
1.5 (IQR)



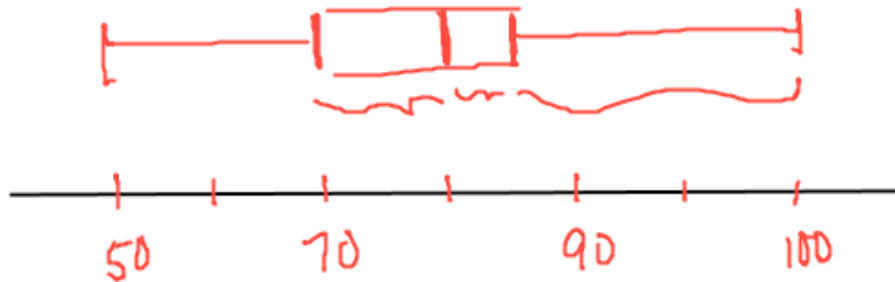
A **cumulative frequency plot** of the percentages (also called an **ogive**) can be used to view the total number of events that occurred up to a certain value.

Example: Here is an ogive for Hudson Auto Repair's cost of parts sold:

Example: Hudson Auto Repair



Where is the median of this data?



1.4

#6 b) IQR

$$\begin{array}{l} Q1 - 1.5(IQR) \\ Q3 + 1.5(IQR) \end{array} \left. \vphantom{\begin{array}{l} Q1 - 1.5(IQR) \\ Q3 + 1.5(IQR) \end{array}} \right\} \text{outlier boundaries}$$

c. put in order  $\rightarrow x_{10}$

$$100 (i - .5) / n$$

$$100 (10 - .5) / 66$$