

Welcome to STAT371, badgers



Chapter 1: Introduction

STAT 371

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“**Statistics** is a **Science** , not a branch of mathematics, but uses mathematical models as essential tools. “

-John Tukey

- 1 Why you need to study statistics
- 2 Some examples about statistics
- 3 What is Statistics?



1 Make a difference.

Statisticians contribute to society in many ways, from protecting endangered species and managing the impacts of climate change to making medicines more effective and reducing hunger and disease.

2 Have fun.

After learning statistics, you could help professional sports teams pick the next season's new players, or a member of the data science team of a U.S. presidential campaign.

3 Make money.

Demand for statisticians is growing, and so are their salaries. The median salary for data scientists with less than three years of experience is \$80,000, and \$150,000 for those with nine or more years of experience.



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Let's look at some statistics



Mean annual salaries of statisticians in 2015

Source: U.S. Bureau of Labor Statistics

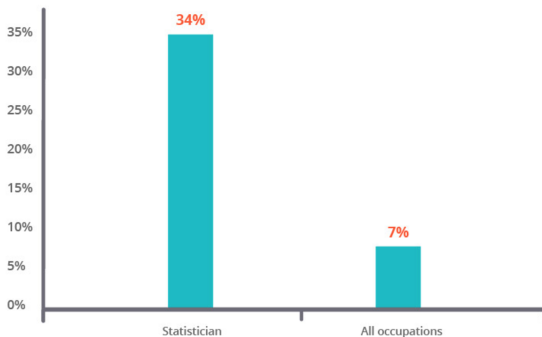


Let's look at some statistics, cont'd



Jobs in statistics are expected to grow faster than average for all occupations

Source: U.S. Bureau of Labor Statistics. Covers employment growth from 2014 to 2024.





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“Assuming that the men and women were on the whole equally well qualified (and there is no evidence to the contrary), the difference in admission rates looks like a strong piece of evidence to show that men and women are treated differently in the admissions procedure.”



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Sex Bias in Graduate Admissions, cont'd



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Major	Men		Women	
	No. Applicants	% Admitted	No. Applicants	% Admitted
A	825	62	108	82
B	560	63	25	68
C	325	37	593	34
D	417	33	375	35
E	191	28	393	24
F	373	6	341	7

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Over 50% of men in this table applied to Majors A + B. Over 90% of women applied to Majors C-F.



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When confronted with statistical data, it is often a good exercise to ask: are there any other explanations for these data that aren't being taken into consideration?

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- 1 Summarizing data in “useful” ways, that could potentially reveal interesting patterns. This is a branch of Statistics known as **Descriptive Statistics**.
- 2 Determining if and to what extent patterns observed in data are “real,” and generalize to a larger context. This is known as **Inferential Statistics**. In inferential statistics, the data form a **sample**, a smaller subset of some well-defined collection of things called a **population**. The idea is to use the sample to learn about the population—the process of inference.

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- Categorical: data that aren't numbers.

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- The ability to carry out simple analyses using a statistical computing package.
- You won't leave fully fledged data analysts, but you will leave prepared to learn more about the discipline.