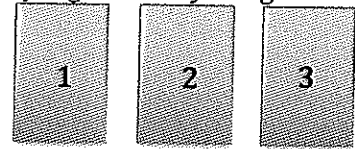


AP Statistics Summer Reading & Assignments 2017

Congratulations on choosing AP Statistics. How would you like to play a game for your grade? Win and get an A. Lose and get an F. All you need to do is choose the right door.



One of the doors has an A, and the other two doors have an F. What are your chances of getting an A? Say you pick Door #1, and I open door number 2 to reveal an F, and then gave you the option of switching to Door #3. Would you switch, or stay with your door? Does it matter? If your grade depends on it, what will you do??

Is random drug testing a good idea? Imagine your math teacher is randomly chosen for a drug test and tests positive. What should the district do? What are the chances he's really a drug user? Would you be surprised that it might be no better than a coin toss?

Two basketball teams of equal skill have an average height of 6'3". Which one is more likely to win? If they have the same skills, training and coaching, and the same average height, what's the difference? How could we tell them apart?

Statistics and probability affect EVERYTHING. From health care, to business decisions, to advertising, to deciding what players to use in Fantasy Football, statistics provide us with the tools to make better choices. This course will give you those tools and prepare you for a wide variety of college programs.

Used correctly, statistics can reveal the **truth** about many things. Unfortunately, like other powerful tools (think fire, or nuclear power), statistics is also easy to **misuse** and **misunderstand**. With this course you will be better able to recognize misleading statistics and the agendas or misunderstandings behind them.

You will learn the major concepts and tools for collecting, analyzing, and drawing conclusions from data. We will analyze data, conduct classroom experiments, carry out individual and group projects, and perform simulations involving probabilistic concepts.

Attached is the summer reading and assignments, which are required. Hopefully you will find the material interesting and surprisingly enjoyable.

Have a great summer!

Phillip Gegen, AP Statistics Teacher

AP Statistics Summer Reading & Assignments 2017

Media Numbers (and How They are Often Misunderstood)

Below is an email I received from the American Cancer Society, 10/29/12.

"Tobacco use causes 1 out of every 5 deaths in Missouri, killing 10,000 Missourians every year. In other states, an increased tobacco tax has been proven to reduce smoking rates - especially among kids - yet in Missouri we still have the lowest tobacco tax in the nation. *Meanwhile, another 8,600 Missouri kids become addicted daily smokers every single day.*"

1. What is wrong with the last sentence in the above paragraph? Be specific and use population data for Missouri to explain. Be sure to document your sources.

2. Look at the graphic below and explain how it is different from the statement above.



3. I doubt the ACS was trying to mislead me with their email, and smoking is a serious health concern (and cost) for society. So if called out on the mistake, they could say, "Well, the point is, we need to reduce teen smoking! 8,600 kids is still a big deal!"

Can you think of any harm in the mistake the ACS made? What if nobody catches or corrects it? What is the possible cost to the American Cancer Society in making an exaggeration like this? What is a possible cost to our state?

AP Statistics Summer Reading & Assignments 2017

If Saints win coin toss, Super Bowl could be over before it starts

Excerpt of article taken from Yahoo! Sports, February 6, 2010:

By Mark Pesavento (current Sr. VP of Content for Fox Sports Digital, Pesavento was with Yahoo! Sports when he wrote this article)

Shortly before the kickoff of Super Bowl XLIV...a member of the newly elected Pro Football Hall of Fame class of 2010 will toss [a coin] to determine who gets the ball first. Saints quarterback Drew Brees will watch it spin into the Miami night and will call heads or tails.

And if he's lucky, he'll guess wrong.

Of the 43 Super Bowls, the team that won the pregame coin toss has won 20 times and lost 23, a .465 winning percentage, and has lost 10 of the last 13.

The NFL's conferences alternate as the home team in the Super Bowl. The AFC is home this year, so the Colts had their choice of jerseys (they'll be in blue) and will stand on the sideline closer to the main CBS cameras. As the visiting team, the NFC's Saints will call the coin flip. The recent trend points to them being right.

Whether this should make Saints fans nervous is a matter of debate; because of the small sample size, some statisticians argue that the win-loss record of coin-toss winners is statistically insignificant. But decide for yourself: The NFC has won 12 straight coin flips and is 2-10 in those games.

If the Saints do win the coin toss, would it improve their odds of victory if they score first? Yes and no. Teams that score first are 28-15 but have lost five of the last eight.

Other Super Bowl coin-flip facts:

- In 43 games, the coin has come up heads 22 times, tails 21.
- The NFC has won the toss 29 times, the AFC 14.
- As mentioned, the NFC has won 12 straight flips. The odds of that: 1 in 8,192.

Questions:

1. Should it be surprising that in 43 games the coin has been heads 22 times? Explain.
2. The team winning the coin toss has only won 20 out of 43 games. The author seems to suggest this is significant or surprising. What do you think?
3. The probability mentioned at the end – 1 in 8192 – is wrong. What are the actual chances of winning 12 coin flips in a row? What were the chances that in 2010 the NFC won again, making it 13 in a row?
4. Teams that score first have won 28 out of 43 Super Bowls. What is the winning percentage? Why might this statistic be more important than the coin toss?

AP Statistics Summer Reading & Assignments 2017

Winter Olympics – Who's Number 1?

Average Medal Score is the weighted average for each nation using the following point values:

Gold=1, Silver=2, Bronze=3. for example, the US score is $\frac{(7 \cdot 1 + 8 \cdot 2 + 10 \cdot 3)}{25} = 2$.

Ranking by Total Medals			Ranking by Average Medal Score			Ranking by Gold Medals		
Nation	Count		Nation	Score		Nation	Count	
1. USA	7/8/10 (25)		1. UK	1.00		1. USA	7	
2. Germany	7/9/5 (21)		2. Australia	1.50		2. Germany	7	
3. Norway	6/3/5 (14)		3. Swiss	1.57		3. Norway	6	
4. Russia	2/3/6 (11)		4. Canada	1.60		4. Canada	5	
5. Canada	5/4/1 (10)		5. China	1.60		5. Swiss	5	
6. S Korea	4/4/1 (9)		6. Netherlands	1.60		6. S Korea	4	
7. Austria	3/3/3 (9)		7. S Korea	1.67		7. Austria	3	
8. France	2/2/4 (8)		8. Sweden	1.86		8. Sweden	3	
9. Swiss	5/0/2 (7)		9. Germany	1.90		9. China	3	
10. Sweden	3/2/2 (7)		10. Norway	1.93		10. Nether	3	
11. China	3/1/1 (5)		11. Austria	2.00		11. Russia	2	
12. Nether	3/1/1 (5)		12. Slovakia	2.00		12. France	2	
13. Poland	0/3/1 (4)		13. Latvia	2.00		13. Slovakia	1	
14. Italy	0/1/3 (4)		14. Estonia	2.00		14. Czech Rep	1	
15. Slovakia	1/1/1 (3)		15. Finland	2.00		15. Australia	1	
16. Czech Rep	1/0/2 (3)		16. Kazakhstan	2.00		16. UK	1	
17. Japan	0/1/2 (3)		17. USA	2.12		17. Poland	0	
18. Australia	1/1/0 (2)		18. France	2.25		18. Italy	0	
19. Latvia	0/2/0 (2)		19. Poland	2.25		19. Japan	0	
20. Belarus	0/1/1 (2)		20. Czech Rep	2.33		20. Latvia	0	
21. Croatia	0/1/1 (2)		21. Russia	2.36		21. Belarus	0	
22. Slovenia	0/1/1 (2)		22. Belarus	2.50		22. Croatia	0	
23. UK	1/0/0 (1)		23. Croatia	2.50		23. Slovenia	0	
24. Estonia	0/1/0 (1)		24. Slovenia	2.50		24. Estonia	0	
25. Finland	0/1/0 (1)		25. Japan	2.67		25. Finland	0	
26. Kazakhstan	0/1/0 (1)		26. Italy	2.75		26. Kazakhstan	0	

Interpreting the Data:

1. Based on Total Medal Count, the US is the top nation. Give one argument for this being the best way to rank nations. Give one argument against using Total Medal Count.
2. Give one argument for and against using Average Medal Score to rank nations.
3. Give one argument for and one argument against only Gold Medals to rank nations.

AP Statistics Summer Reading & Assignments 2017

Read the first several lines of the article below and answer questions 1-3.

Too Much TV May Take Years Off Your Life

*By **Steven Reinberg***

HealthDay Reporter | HealthDay – Monday, August 15, 2011

Spending your days in front of the television may contribute to a shortened lifespan, a new study suggests.

Researchers in Australia found that people who averaged six hours a day of TV lived, on average, nearly five years less than people who watched no TV.

For every hour of television watched after age 25, lifespan fell by 22 minutes, according to the research led by Dr. J. Lennert Veerman of the University of Queensland....

Questions:

- 1) In one sentence, summarize the findings reported for the study on TV viewing.

- 2) Did you use the word “cause” in your sentence? Why do you think “cause” might be too strong a word to use here?

- 3) Maybe TVs emit death rays, and the more TV you watch, the sooner you die. Or maybe there are other factors that have nothing to do with televisions directly. Come up with at least three possible reasons besides death rays for the results found in the study.

Now flip the page and read on...and then answer question #4 at the very end.

AP Statistics Summer Reading & Assignments 2017

...But other experts cautioned that the study did not show that TV watching caused people to die sooner, only that there was an association between watching lots of TV and a shorter lifespan.

Though a direct link between watching TV and a shortened lifespan is highly provocative, the harms of TV are almost certainly indirect, said Dr. David L. Katz, director of the Prevention Research Center at Yale University School of Medicine.

"As a rule, the more time we spend watching TV, the more time we spend eating mindlessly in front of the TV, and the less time we spend being physically active," Katz said. "More eating and less physical activity, in turn, mean greater risk for obesity, and the chronic diseases it tends to anticipate, notably diabetes, heart disease and cancer."

Another explanation for the possible link may be that people who watch excessive amounts of TV "are lonely, or isolated, or depressed, and these conditions, in turn, may be the real causes of premature mortality."

In the study, researchers used data on 11,000 people aged 25 and older from the Australian Diabetes, Obesity and Lifestyle Study, which included survey information about how much TV people watched in a week. Researchers also used national population and mortality figures.

In 2008, Australian adults watched a total of 9.8 billion hours of TV. People who watched more than six hours of TV were in the top 1 percent for TV viewing.

The statistics suggest that too much TV may be as dangerous as smoking and lack of exercise in reducing life expectancy, the researchers said. For example, smoking can shorten of life expectancy by more than four years after the age of 50. That represents 11 minutes of life lost for every cigarette and that's the same as half an hour of TV watching, the researchers said. Without TV, researchers estimated life expectancy for men would be 1.8 years longer and for women, 1.5 years longer.

"While we used Australian data, the effects in other industrialized and developing countries are likely to be comparable, given the typically large amounts of time spent watching TV and similarities in disease patterns," the researchers noted.

Dr. Gregg Fonarow, associate chief of cardiology at the David Geffen School of Medicine at University of California, Los Angeles, said that "there is increasing evidence that the amount of time spent in sedentary activity such as TV watching, distinct from the amount of time spent in purposeful exercise, may adversely impact health."

And although participating in a regular exercise program can help, it may not be enough to offset the risks of spending too much of the rest of the day -- while at work or at home -- getting no exercise whatsoever.

"Staying active and reducing time spent sedentary may be of benefit in reducing the risk of cardiovascular disease and may be considered as part of a comprehensive approach to improve cardiovascular health," Fonarow added.

Dr. Robert J. Myerburg, a professor of medicine at the University of Miami Miller School of Medicine, added that "a sedentary lifestyle can reduce life expectancy."

Myerburg isn't sure why sitting around is not good for your health. "It's better to look at it from a positive prospective," he said. "That is: a physically active lifestyle is protective."

AP Statistics Summer Reading & Assignments 2017

Television viewing time and reduced life expectancy: a life table analysis

1. J Lennert Veerman¹, Genevieve N Healy^{2,3}, Linda J Cobiac¹, Theo Vos¹, Elisabeth A H Winkler¹,
2. Neville Owen^{2,3}, David W Dunstan¹

+ Author Affiliations

1. ¹*Ctr for Burden of Disease & Cost-Effectiveness, School of Pop Health, The U of Queensland, Brisbane, Australia*

2. ²*Cancer Prevention Research Centre, School of Pop. Health, The U of Queensland, Brisbane, Australia*

3. ³*Baker IDI Heart and Diabetes Institute, Melbourne, Australia*

Abstract

Background Prolonged television (TV) viewing time is unfavorably associated with mortality outcomes, particularly for cardiovascular disease, but the impact on life expectancy has not been quantified. The authors estimate the extent to which TV viewing time reduces life expectancy in Australia, 2008.

Methods The authors constructed a life table model that incorporates a previously reported mortality risk associated with TV time. Data were from the Australian Bureau of Statistics and the Australian Diabetes, Obesity and Lifestyle Study, a national population-based observational survey that started in 1999–2000. The authors modelled impacts of changes in population average TV viewing time on life expectancy at birth.

Results The amount of TV viewed in Australia in 2008 reduced life expectancy at birth by 1.8 years (95% uncertainty interval (UI): 8.4 days to 3.7 years) for men and 1.5 years (95% UI: 6.8 days to 3.1 years) for women. Compared with persons who watch no TV, those who spend a lifetime average of 6 h/day watching TV can expect to live 4.8 years (95% UI: 11 days to 10.4 years) less. On average, every single hour of TV viewed after the age of 25 reduces the viewer's life expectancy by 21.8 (95% UI: 0.3–44.7) min. This study is limited by the low precision with which the relationship between TV viewing time and mortality is currently known.

Conclusions TV viewing time may be associated with a loss of life that is comparable to other major chronic disease risk factors such as physical inactivity and obesity.

Questions

- 4) How does the conclusion listed by the researchers in the Abstract above compare with the conclusions stated or implied by the article?

And last but not least, one of the most important pictures and ideas you will work with in this course. Introducing...Norm!

AP Statistics Summer Reading & Assignments 2017



Whoops, wrong Norm. Although this guy is just as good a friend on the 80's TV show Cheers as our friend Norm will be in AP Statistics.

The NEXT page has our Norm – the Normal Distribution.

Learn it. Memorize it. Use it. It will become your best friend.

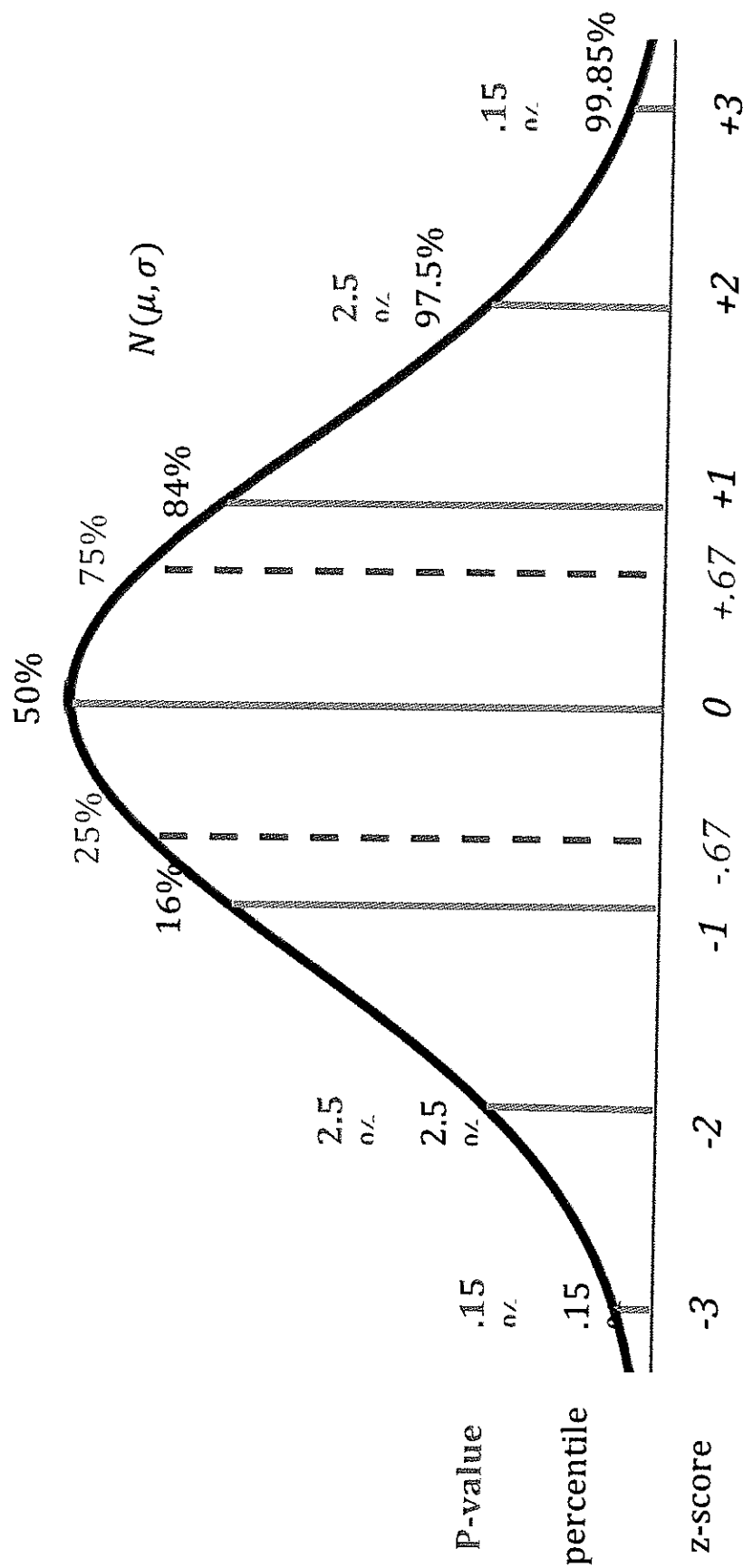
SERIOUSLY – this is one of the biggest things we will use all year. AND you will use it in AP Psych also (if you are taking that class).

AP Statistics Summer Reading & Assignments 2017

The Normal Distribution (I often call it "Norm.") Amazingly, this models almost any population you can think of. Whatever the mean and standard deviation, the percentages for Normal populations always look like this.

MEMORIZE this picture. We will use it in more ways than you can imagine.

Expect a quiz on this the **FIRST DAY** of class!

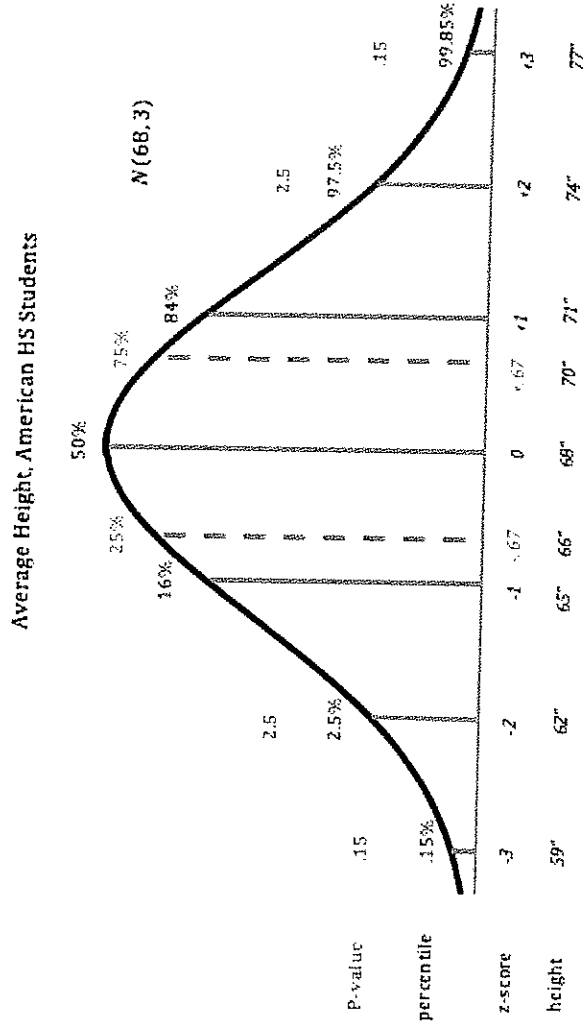


AP Statistics Summer Reading & Assignments 2017

A Quick Example of What Norm Can Tell You

Let's say the average height of high school students across the country is 68" with a standard deviation of 3". I could say that a typical student is 5'8" tall, plus or minus 3 inches. But I can actually say a LOT more than that.

- 50% of students are between 5'6" and 5'10" tall.
- 68% (84%-16%) are within 1 standard deviation of average – between 5'5" and 5'11".
- 95% of all HS students are between 5'2" and 6'2".
- Only 2.5% of students are taller than 6'2"



We can apply this to Oak Park!

- For Oak Park, with around 1400 students, this means about 700 students are between 5'6" and 5'10".
- Around 30-35 students are over 6'2", and only 2 or 3 are taller than 6'5".
- There are also around 30-35 students shorter than 5'2", and only a few are below 5 feet tall.