

Midterm (75 minutes)

No calculators allowed. Just set up your answers, for example, $P = 49/52$. If you want extra time, you can buy time at a price of 1 point a minute; for example, if your test is handed in 10 minutes after the scheduled finish time, 10 points will be subtracted from your test score.

1. In a 2015 interview on “Late Night with Seth Meyers,” Senator Ted Cruz stated that, “Many of the alarmists on global warming, they’ve got a problem because the science doesn’t back them up. In particular, satellite data demonstrate for the last 17 years, there’s been zero warming.” As a statistician (not a global-warming expert), why are you skeptical?
2. For a certain microwave oven and brand of popcorn, the time it takes a randomly selected kernel of popcorn to pop is normally distributed with the mean of 150 seconds and a standard deviation of 20 seconds. What percentage of the kernels do you expect to have been popped after 3 minutes (180 seconds)?
3. In OneOfEachLand, every woman who has babies keeps having babies until she has at least one boy and one girl, and then stops having babies. What is the average number of babies that women have? (Assume that boy and girl babies are equally likely and do not depend on whether previous babies have been boys or girls.)
4. Use some specific hypothetical numbers to explain why these data do not necessarily justify this conclusion by the magazine California Highways:
A large metropolitan police department made a check of the clothing worn by pedestrians killed in traffic at night. About four-fifths of the victims were wearing dark clothes and one-fifth light-colored garments. This study points up the rule that pedestrians are less likely to encounter traffic mishaps at night if they wear or carry something white after dark so that drivers can see them more easily.

5. A researcher reported that the number of diet-related articles in the popular press totaled sixty during the entire year 1979, but totaled fifty in the single month January 1989. As a statistician, what other information would you want to see before concluding that the popular press was much more concerned about dieting in 1989 than in 1979?

6. The table below gives the estimated probability that a U.S. woman who is the specified age in the specified year will die that year; for example, among U.S. women who are 61 years old in 2021, the probability of dying that year is 0.007919. What is the probability that a woman who is 59 years old in 2019 will live to age 69?

Year	Age	Death Probability
2019	59	0.006619
2020	60	0.007225
2021	61	0.007919
2022	62	0.008784
2023	63	0.009858
2024	64	0.011109
2025	65	0.012512
2026	66	0.013930
2027	67	0.015215
2028	68	0.016292
2029	69	0.017247

7. The *Wall Street Journal* and *Washington Post* both reported the results of a study that estimated the probability that a 40-year-old, sober, seat-belted person driving a heavier-than-average car would have a fatal accident while making a 600-mile automobile trip. The researchers calculated this probability by multiplying the overall driver fatality rate by 4 risk factors. For example, the probability that a heavier-than-average car will have a fatal accident is 0.77 times the probability that a car of average weight will have a fatal accident. So, the overall driver fatality rate was multiplied by 0.77. This number was then multiplied by 0.68 because the probability that a 40-year-old will have a fatal accident is only 0.68 times the probability that a driver of average age will have a fatal accident. Similar adjustments were made for being sober and wearing a seat belt. What is wrong with this calculation?

8. A sales guru gave an inspirational presentation in which he argued that each *no* brings you closer to a *yes*, because 1 out of every 100 phone calls results in a sale. You just have to get through those 99 *no*'s to get to a *yes*. As a statistician, what do you say?

9. A renowned stock picker claims that he has better than a 50% chance of picking stocks that will do better than the median stock over the next 12 months. To demonstrate this prowess, he picks 10 stocks out of the Russell 3000 (which consists of the 3,000 largest U.S. companies) and a year later it turns out that 6 have done better than the median return and 4 have done worse.
- If he guesses randomly, what is the probability that 6 or more of his picks will beat the median return?
 - If he guesses randomly, would he be more or less likely to get 60% or more correct if he picked 20 stocks instead of 10?
 - Do your calculations assume that stock returns are normally distributed?

10. As a statistician, how would you criticize this Yahoo news report?

Pizza may have originated in Italy, but ever since it entered the U.S. market, Americans can't get enough. But which fast-food pizza joint is the best, according to Americans?

Market Force Information, a customer experience management company, conducted a survey of over 7,600 American adults to find out their favorite fast-food restaurants — and in the pizza category, one restaurant was the clear winner.

Blaze Pizza, a pizza chain backed by NBA champion LeBron James, took the top spot as America's overall favorite fast-food pizza.

AMERICA'S FAVORITE PIZZA CHAINS

For the rankings, Market Force asked participants to rate their satisfaction with their most recent QSR experience, and their likelihood to refer that restaurant to others. The results were averaged to attain a Composite Loyalty Index score. Only chains that received at least 100 consumer responses and representing 2% or more of responses were analyzed.



SOURCE: MARKET FORCE INFORMATION
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