

Final Exam (Take-home)

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Due Date

Submission deadline: Wed, December 9th, 11:59 pm ET

No late submission will be accepted unless a related accomodation request has been granted by the Services for Students with Disabilities.

General Description

This take-home exam consists of two parts:

- Part A - Short-answer questions (32 points)
- Part B - Multiple choice questions (17 points)

You will find separate submission links for each part on myCourses. See the detailed instructions for each part below.

You should work individually. Any unauthorized collaboration is prohibited.

Part A - Short-answer Questions

You need to submit

- A written response to the questions. You can print out the questions, write down your solutions, scan the solutions, and submit them in a combined .pdf file named “Final_YourFirstName_YourLastName.pdf”.

Show your work to receive full points.

1. Run the commands below in R:

```
set.seed(XXX)
```

```
x <- sample(11:20, 1)
```

Replace “XXX” with the last three digits of your B-number.

What is your x value? (2pts)

You will use the x value for the rest of the exam.

2. The summit point of Mount Everest has an expected elevation of 8,848 meters. A new equipment had x independent readings of the elevation of Mount Everest. The readings have an average of 8,855 meters and an SD of 10 meters. Is there a bias in these readings?

Construct a proper hypothesis test, calculate the P-value and interpret the P-value. (10 pts)

3. A researcher wants to test if a pair of dice is fair. The researcher threw the pair of dice $36x$ times and obtained the total number spots. The results are summarized in the table below.

Total number of spots	2	3	4	5	6	7	8	9	10	11	12	Total
Observed frequency	$x - 1$	$2x + 3$	$3x + 2$	$4x - 5$	$5x + 2$	$6x - 10$	$5x + 5$	$4x + 4$	$3x + 1$	$2x - 1$	x	$36x$

Is the pair of dice fair? Construct a proper hypothesis test, calculate the P-value and interpret the P-value. (10 pts)

4. Suppose you are running a venture capitalist and wants to invest in tech startups. Once a business has developed a track record (an established user base, consistent revenue figures, or some other key performance indicator), that company may opt for Series A funding in order to further optimize its user base and product offerings.

According to a study, the average Series A funding as of 2020 is \$15.6 million. To verify the authenticity of this study, you collected data from a random sample of 10x startups. You found that the average Series A funding they received as of 2020 is \$14.8 million and the sample standard deviation of these Series A fundings is \$1.2 million. According to this sample, is it true that the average Series A funding as of 2020 is \$15.6 million?

Construct a proper hypothesis test, calculate the P-value and interpret the P-value. (10 pts)

Part B - Multiple Choice Questions

You can find the link to the multiple choice questions on myCourses.

The exam is **not timed**, and it can be saved and resumed later.

However, you need to complete the questions by the end of Wed, December 9th. The link will be closed after that.